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Editorial

CULTURAL ANESTHETICS

by
Stanley Schmidt

Anesthesia, as most of us usually understand the term, is undoubtedly one of the great (and surprisingly recent) advances in the practice of medicine. Through the use of such agents as diethyl ether, Novocain (procaine hydrochloride), and an arsenal of others that has grown through the years, it has become possible to perform, routinely and painlessly, surgical and dental procedures which would otherwise be accompanied by excruciating pain.

But the term "anesthesia" really has a more general meaning than the intentional deadening of pain. Insensibility to *pain*, specifically, is *analgesia*. *Anesthesia* implies the loss of bodily sensation in general, which certainly includes pain, but also includes other things. (If you doubt, try kissing with a mouth shot full of Novocain.)

An interesting phenomenon which I've seldom heard spoken of in these terms is that human *societies* also use anesthetics on their members and thus, in effect, on themselves. The number

and variety of these cultural anesthetics is quite large, as is the variation in the degree to which the society and its members recognize their existence as such.

Consider a few examples.

Funerals are a widespread (though highly variable) institution which reduce the pain of death, not for the dying, but for the living. They are aided in many cases by religions which offer hope for some sort of afterlife. I doubt that this is quite what Marxists had in mind when they first called religion "the opiate of the masses," but I don't doubt that some governments have found it convenient to use religion as just that.

Rules of etiquette (and diplomatic protocol) facilitate social and business interactions between individuals (and larger entities) who might be constantly at each other's throats if they were allowed to be too conscious of their true feelings toward each other.

Withholding income taxes makes payment not only easier but less painful

than collecting them in cash at the end of the year. A freelance writer, for example, is far more conscious of how much he contributes to his government than are most salaried employees. The freelancer must fork over a large lump sum out of every check he receives, for nothing is withheld. The employee, having most of his taxes withheld automatically, never actually has the money in his hands and therefore never truly *feels* that it is his or that it is being taken from him.

We have special words to describe government actions which are perceived as necessary for the social good, when the same actions would be considered reprehensible or criminal when performed by private individuals or groups. By saying "execution" instead of "homicide" or "murder," "taxation" or "eminent domain" instead of "theft" or "extortion," "conscription" instead of "enslavement," and so on, we spare ourselves the guilt we might feel if we allowed the unpleasant connotations of the latter word in each pair to be attached to the action described by the former (to say nothing of the lawlessness that might grow out of such feelings). (This device runs deep. This paragraph may make you angry—at least partly, I'd guess, because the words in each pair are so sharply separated in your mind that you're shocked that anybody would suggest they have anything in common, yet you're hard put to find a definitive difference in the acts themselves, other than who does them and why.)

Supermarkets allow people to sweep

under mental rugs the fact that other living things must die for them to survive. How many lifelong city dwellers ordering steak in a restaurant *really* grasp the fact that that steak was recently part of a living animal, whose life was deliberately and involuntarily ended to put meat on the table?

Department stores enable people to buy elegant wood furniture and paper books while making pious outcries against the cutting of trees. Somebody *else* cuts *their* trees, and they can pretend, even in their own minds, that it never happened.

The ready availability of energy from wall outlets makes it possible to use that energy for a lifetime with no conception of the fact that behind every erg lie mined countrysides, inevitably depleted resources, and hard questions of safety and cost and environmental impact.

Before I go any further, perhaps I should pause and emphasize that I am *not* condemning all the things some careless readers will inevitably accuse me of. Death is a profoundly painful fact of life and people do need help to endure it. We do need ways to lubricate our dealings with each other. At least some of the things governments do, such as some taxation, are indeed necessary, and we should not burden ourselves with guilt for doing them to the extent that they are necessary. I enjoy a good steak as much as anyone—but I don't kid myself about where it came from: I accept killing for that purpose as a normal and necessary part of the way ecology works, and I cannot view myself as something above or apart

from the ecosystem. Manufacturing centers and distribution networks give individuals a highly desirable range of choices as to how they live; power networks free them from a lot of worries as to how to implement those choices. A frontier farmer may be self-sufficient, as far as survival is concerned, but he tends to be rather limited in what he can do beyond just surviving.

All I'm doing is pointing out the existence of an effect I observe—the fact that the things I've mentioned, in addition to their other properties, act as anesthetics—and suggesting that it's important for those thus anesthetized to be aware of that fact. The reason is simple. Anesthesia, wisely used, is a great blessing—but it is not *always* and *automatically* beneficial.

Pain, you'll remember, also serves a purpose.

Pain seems to have evolved as a danger warning system. It alerts the central nervous system when tissue is being damaged somewhere in the body, so that the endangered part can be withdrawn from whatever is doing the damage (or vice versa). It's nice to know when your hand is resting on an active stove burner or soldering iron, so you can get it off while there's still some left.

Individuals have been born without the ability to feel pain. Fortunately pain is not the only warning system the body has, so these people are able to adjust to living in a perpetual state of partial anesthesia—but they have to be extraordinarily careful and attentive to their other senses. If you can't feel pain,

you'd better *watch* every move your hand makes, or it may stay on a stove far longer than it should. Or you may go swimming, step on something sharp, and bleed yourself into a stupor before you realize anything is amiss.

Which is Not Good for You.

The trouble with being anesthetized, intentionally or otherwise, is that people or objects can do all manner of injurious things to you, and you can't defend yourself because you don't know they're happening. You *trust* your surgeon or dentist to do to you only things which will *help* you, despite the pain they would cause without anesthesia, and to protect you from outside dangers while you are under the anesthetic.

You would not, I hope, want to go anesthetized into the company of an enemy or a rambunctious lion.

Or even a well-meaning but clumsy surgeon.

Nor would you want *anyone* to anesthetize you without your knowledge.

Is it possible that cultural anesthetics may sometimes desensitize us (meaning the members of *any* culture, not just this one) not only to things they should, but to other things as well? Things that we *should* be aware of, because they warn us of unsuspected dangers, or because ignorance of them distorts our perception of what we, as a culture, are doing?

The possibility is not hard to conceive. Con men are often successful precisely because they use the anesthetics of etiquette and charm so skillfully that their victims never suspect they are less benevolent than they appear—until it's too late. A citizen who

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is not acutely conscious of how much tax he is paying may feel little incentive to keep close tabs on how wisely it is spent. A persuasive choice of words may lull a citizenry into going along with the most bizarre political schemes—as Herr Hitler so ably showed us (and as too many of us are already forgetting). A person who does not know, emotionally as well as intellectually, where his food comes from, can easily become insensitive to the value of any life but his own. One who feels in his bones that electricity comes magically from walls may make reckless decisions based on the conviction that the problems of how to get the magic into the walls have simple answers.

How can a culture guard against such dangers? Blindly charging forth to do away with all the anesthetics, even if it were possible, would probably be self-defeating. At least some of them, after all, do serve at least some useful purposes. Immediately doing away with all etiquette or all government powers would almost certainly do more harm than good to any existing culture. Even if income tax withholding does more harm than good (as I privately suspect it may), I would be wary of any attempt to abolish it too suddenly. It's a tossup which would happen first: national bankruptcy because so many citizens simply could not produce the sums demanded at year's end, or armed revolt when they realized for the first time just how much was being demanded. Neither, I suspect, would be good for the country. I would not advocate sending everyone back to farm a private, iso-

lated plot of land, or ask anyone to stop using all the food and energy and materials he needs and can reasonably obtain.

But I do think everyone should be aware of what's really happening when he does these things. It's to their own benefit for the inhabitants of any culture to pause occasionally and take stock of what anesthetics are currently active in their system, and what undesirable side effects they might have. If any are found whose detrimental effects outweigh their benefits, it would be worth considerable effort to find ways to phase them out and replace them with something better.

It may be, in the universe at large, that societies which are to endure for long times must have built-in mechanisms to keep their members conscious of what anesthetics they are using and what realities they obscure. No Earthly civilization has yet endured a very long time, in the terms I am talking about. We have not long, for example, been in a position where many people were so isolated from their food and energy supplies that they could forget that they remain locked in networks of global interdependence. People who do not understand that fact are both likely to make misjudgments in using and administering resources, and highly vulnerable to any disruption of their normal supply channels. I can easily imagine a highly advanced civilization requiring its members periodically to kill their own food, to insure that they don't forget that that is a prerequisite to their eating, even if someone else normally does it

for them. Other mechanisms, some of them quite difficult for us to imagine, might evolve to offset the effects of other anesthetics.

The real dangers in anesthesia (other than faulty application) occur when the patient is unaware that he is anesthetized; or when, though aware of that, he is exposed to dangers other than the one he bargained for when he accepted

the anesthetic—but to which the anesthetic also desensitizes him. When the patient is a whole society—for which really good doctors are even harder to find than for individuals—it especially needs to be reminded, from time to time, that it is using anesthetics. Then, at the very least, it can make extra sure that its other senses are vigilant for dangers the anesthetics may hide. ■



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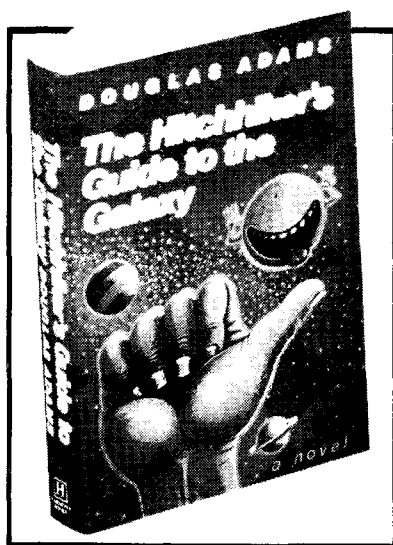
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David R. Palmer

EMERGENCE

What do you do after the end of the world? That depends on what's left—and on what kind of survivor you are.

Nothing to do? Nowhere to go? Time hangs heavy? Bored? Depressed? Also badly scared? Causal factors beyond control?

Unfortunate. Regrettable. Vicious cycle—snake swallowing own tail. Mind dwells on problems; problems fester, assume ever greater importance for mind to dwell on. Etc. Bad enough where problems minor.

Mine aren't.

Psychology text offers varied solutions: recommends keeping occupied, busywork if necessary; keep mind distracted. Better if busywork offers challenge, degree of frustration. Still better that I have responsibility. All helps.

Perhaps.

Anyway, keeping busy difficult. Granted, more books in shelter than public library; more tools, equipment, supplies, etc., than Swiss Family Robinson's wrecked ship—all latest developments: lightest, simplest, cleverest, most reliable, non-rusting, Sanforized. All useless unless—correction, *until* I get out (and of lot, know uses of maybe half dozen: screwdriver for opening stuck drawer; hammer to tenderize steak, break ice cubes; hacksaw for cutting frozen meat . . .).

Oh, well, surely must be books explaining selection, use.

Truly, surely are books—thousands! Plus microfilm library—even bigger. Much deep stuff: classics, contemporary; comprehensive museum of man's finest works: words, canvas, 3-D and multi-view reproductions of statuary. Also scientific: medical, dental, veterinary, entomology, genetics, marine biology; engineering, electronics, physics (both nuclear and garden variety),

meteorology, astronomy; carpentry, agriculture, welding (equipment, too), woodcraft, survival, etc., etc., etc.; poetry, fiction, biographies of great, near-great; philosophy—even complete selection of world's fantasy, new and old. Complete Oz books, etc., Happy surprise, that.

Daddy was determined man's highest achievements not vanish in Fireworks; also positive same just around corner. Confession: Wondered sometimes if was playing with complete deck; spent incalculable sums on shelter and contents. Turns out was right; is probably having last laugh Somewhere. Wish were here to needle me about it—but wouldn't if could; was too nice. Miss him. Very much.

Growing maudlin. Above definitely constitutes "dwelling" in pathological sense as defined by psychology text. Time to click heels, clap hands, smile, Shuffle Off to Buffalo.

Anyhow, mountains of books, microfilm of limited benefit; too deep. Take classics: Can tolerate just so long; then side effects set in. Resembles obtaining manicure by scratching fingernails on blackboard—can, but would rather suffer long fingernails. Same with classics as sole remedy for "dwelling": Not sure which is worse. May be that too much culture in sudden doses harmful to health: perhaps must build up immunity progressively.

And technical is worse. Thought I had good foundation in math, basic sciences. Wrong—background good, considering age; but here haven't found anything elementary enough to form opening wedge. Of course, haven't gotten organized yet; haven't assimilated

catalog, planned orderly approach to subjects of interest. Shall; but for now, can get almost as bored looking at horrid pictures of results of endocrine misfunctions as by wading through classics.

And am rationing fantasy, of course. Thousands of titles, but doesn't lose head. Speedreader, you know: breach discipline, well runs dry in matter of days.

Then found book on Pitman Shorthand. Changed everything. Told once by unimpeachable source (Mrs. Hartman, Daddy's secretary and receptionist) was best, potentially fastest, most versatile of various pen systems. Also most difficult to learn well. (Footnote, concession to historical accuracy: Was also her system; source possibly contaminated by tinge of bias.) However, seemed promising; offered challenge, frustration. Besides, pothook patterns quite pretty, art form of sorts. Hoped would be entertaining.

Was—for about two days. Then memory finished absorbing principles of shorthand theory, guidelines for briefing and phrasing; transferred same to cortex—end of challenge. Tiresome being genius sometimes.

Well, even if no longer entertaining for own sake, still useful, much more practical than longhand: ideal for keeping journal, writing biography for archeologists. Probably not bother if limited to longhand; too slow, cumbersome. Effort involved would dull enthusiasm (of which little present anyway), wipe out paper supply in short order. Pitman fits entire life story on line and a half. (Of course, helps I had short life—correction: Helps brevity; does nothing for spirits.)

Problem with spirits serious business. Body trapped far underground; emotional index substantially lower. Prospects not good for body getting out alive, but odds not improved by emotional state. Depression renders intelligent option assessment improbable. In present condition would likely overlook ten good bets, flip coin over dregs. Situation probably not hopeless as seems, but lacking data, useful education, specialized knowledge (and guts), can't form viable conclusion suggesting happy ending. And lacking same, tend to assume worst.

So journal not just for archeologists; is therapeutic. Catharsis: Spill guts on paper, feel better. Must be true—psychology text says so (though cautions is better to pay Ph.D.-equipped voyeur week's salary per hour to listen. However, none such included in shelter inventory; will have to make do).

First step: Bring journal up to date. Never kept one; not conversant with format requirements. Right Thing To Do. Therefore will use own judgment. One thing certain: Sentence structure throughout will have English teachers spinning in graves (those fortunate enough to have one).

English 60 percent flab, null symbols, waste. Suspect massive inefficiency stems from subconsciously recognized need to stall, give inferior intellects chance to collect thoughts into semblance of coherence (usually without success), and to show off (my \$12-word can lick your \$10-word). Will not adhere to precedent; makes little sense to write shorthand, then cancel advantage by employment of rambling academese.

Keep getting sidetracked into social criticism. Probably symptom of condition. Stupid; all evidence says no society left. Was saying:

First step: Bring journal up to present; purge self of neuroses, sundry hangups. Then record daily orderly progress in study of situation, subsequent systematic (brilliant) self-extrication from dire straits. Benefits twofold:

First, will wash, dry, fold, put away psyche; restore mind to customary genius; enhance prospects for successful escape, subsequent survival. Second, will give archeologists details on cause of untimely demise amidst confusing mass of artifacts in shelter should anticipated first benefit lose rosy glow. (Must confess solicitude for bone groppers forced; bones in question *mine*!)

Enough maundering. Time to bear down, flay soul for own good. Being neurotic almost as tiresome as being genius. (Attention archeologists: Clear room of impressionable youths and/or mixed company—torrid details follow:)

Born 11 years ago in small Wisconsin town, only child of normal parents. Named Candidia Maria Smith; reduced to Candy before ink dried on certificate. Early indications of atypicality: Eyes focused, tracked at birth; cause-effect association evident by six weeks; first words at four months; sentences at six months.

Orphaned at ten months. Parents killed in car accident.

No relatives—created dilemma for baby-sitter. Solved when social worker took charge. Was awfully cute baby; adopted in record time.

Doctor Foster and wife good parents; loving, attentive; very fond of each

other, showed it. Provided good environment for formative years. Then Momma died. Left just Daddy and me; drew us very close. Was probably shamelessly spoiled, but also stifled.

Barely five then, but wanted to *learn*—only Daddy had firm notions concerning appropriate learning pace, direction for “normal” upbringing. Did not approve of precocity; felt was unhealthy, would lead to future maladjustment, unhappiness. Also paternalistic sexist; had bad case of ingrown ster-eotypitis. Censored activities, reading; dragged heels at slightest suggestion of precocious behavior, atypical interests.

Momma disagreed; aided, indulged. With her help I learned to read by age two; understood basic numerical relationships by three; could add, subtract, multiply, divide. Big help until she had to leave.

So sneaked most of education. Had to—certainly not available in small-town classroom. Not difficult: developed speedreading habit, could finish high school text in 10, 20 minutes; digest typical best-seller in half, three-quarters of hour. Haunted school, local libraries every opportunity (visits only; couldn’t bring choices home). But town small; exhausted obvious resources three years ago. Have existed since on meager fruits of covert operations in friends’ homes, bookstores, occasional raids on neighboring towns’ libraries, schools. Of course not all such forays profitable: small-town resources tend to run same direction: slowly, in circles. Catalogs mostly shallow, duplicated; originality lacking.

Frustrating. Made more so by knowledge that Daddy’s personal in-house li-

brary rivaled volume count of local school, public libraries put together (not counting shelter collection, but didn't know about that then)—and couldn't get halfway down first page of 95 percent of contents.

Daddy pathologist: books imperiously technical. So far over head, couldn't even tell where gap lay (ask cannibal fresh off plane from Amazon for analysis of educational deficiencies causing noncomprehension of commercial banking structure). Texts dense: assumed reader already possessing high-level competency. Sadly lacking in own case—result of conspiracy. So languished, fed in dribbles as tireless prospecting uncovered new sources.

Single bright exception: Soo Kim McDivott, son of American missionary in Boxer Rebellion days, product of early East-West alliance. Was 73 when retired, moved next door two years ago. Apparently had been teacher whole life but never achieved tenure: tended to get fired over views. Didn't appear to mind.

Strange old man. Gentle, soft-spoken, very polite; small, seemed almost frail. Oriental flavoring lent elf-like quality to wizened features: effect not reduced by mischief sparkling from eyes.

Within two weeks became juvenile activity focus for most of town. Cannot speak for bulk of kids, but motivation obvious in own case: Aside from intrinsic personal warmth, knew everything—and if exception turned up would gleefully drop everything, help find out—and had *books*. House undoubtedly in violation of Fire Code: often wondered how structural members took load.

Fascinating man: could, would discuss anything. But wondered for a time how managed as teacher: never answered questions but with questions. Seemed whenever I had question, ended up doing own research, telling *him* answer. Took a while to catch on, longer before truly appreciated: Had no interest in teaching knowledge, factual information—taught learning. Difference important: seldom understood, even more rarely appreciated. Don't doubt was reason for low retirement income.

Oh, almost forgot: Could split bricks with sidelong glance, wreak untold destruction with twitch of muscle. Any muscle. Was Tenth Degree Master of Karate. Didn't know were such; thought ratings stopped at Eighth—and heard rumors *they* could walk on water. (But doubt Master Mac would bother. Should need arise, would politely ask waters to part—but more likely request anticipated, unnecessary.)

Second day after moving in, Master was strolling down Main Street when happened upon four young men, early 20s, drunk, unkempt—Summer People (sorry, my single ineradicable prejudice)—engaged in self-expression at Miller's Drugstore. Activities consisted of inverting furniture, displays: dumping soda-fountain containers (milk, syrup, etc.) on floor; throwing merchandise through display windows. Were discussing also throwing Mr. Miller when Master Mac arrived on scene.

Assessed situation: politely requested cease, desist, await authorities' arrival. Disbelieving onlookers closed, averted eyes; didn't want to watch expected carnage. Filthy Four dropped Mr. Miller, converged on frail-looking old Chinese.

Then all fell down, had subsequent difficulty arising. Situation remained static until police arrived.

Filthies taken into custody, then to hospital. Attempted investigation of altercation unrewarding: Too many eyewitness accounts—all contradictory, disbelieving, unlikely. However, recurring similarities in stories suggested simultaneous stumble as Filthies reached for Master; then all fell, accumulating severe injuries therefrom: four broken jaws, two arms, two legs, two wrists; two dislocated hips; two ruptured spleens. Plus bruises in astonishing places.

Single point of unanimity—ask *anyone*: Master Mac never moved throughout.

Police took notes in visibly strained silence. Also took statement from Master Mac. But of dubious help: Consisted mostly of questions.

Following week YMCA announced Master Mac to teach karate classes. Resulted in near riot (by small-town standards). Standing room only at registration: near fistfights over positions in line.

Was 16th on list to start first classes but deserve no credit for inclusion: Daddy's doing. Wanted badly—considering sociological trends, self-defense skills looked ever more like required social graces for future survival—but hesitated to broach subject: seemed probable conflict with "normal upbringing" dictum.

So finally asked. Surprise! Agreed—granted dispensation! Was still in shock when Daddy asked time, date of registration. Showed article in paper: noon tomorrow. Looked thoughtful maybe five seconds; then rushed us out-

doors, down street to Y. Already 15 ahead of us, equipped to stay duration.

Daddy common as old slipper: warm, comfortable, folksy. But shared aspects with iceberg: Nine-tenths of brains not evident in everyday life. Knew was very smart, of course. Implicit from job: pathologist knows everything any other specialist does, plus own job. Obviously not career for cretin—and was *good* pathologist. Renowned.

But not show-off: was easy to forget; reminders few, far between. Scope, foresight, quick reactions. Command Presence demonstrated only in time of need.

Such occurred now: While I stood in line with mouth open (and 20 more hopefuls piled up behind like Keystone Cops), Daddy organized friends to bring chairs, cot, food, drink, warm clothing, blankets, rainproofs, etc. Took three minutes on phone. Was impressed. Then astounded—spent whole night on sidewalk with me, splitting watches, trading off visits to Little Person's room when need arose.

Got all choked up when he announced intention. Hugged him breathless; told him Kismet had provided better father than most workings of genetic coincidence. Did not reply, but got hugged back harder than usual; caught glimpse of extra reflections in corners of eyes from streetlight. Special night; full of warmth, feelings of belonging, togetherness.

After Daddy's magnificent contribution, effort to get me into class, felt slight pangs of guilt over my subsequent misdirection, concealment of true motivation. True, attended classes, worked hard; became, in fact, star pupil. But

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had to—star pupils qualified for private instruction—yup!—at Master's home, surrounded by what appeared to be 90 percent of books in Creation.

Earned way though. Devoted great effort to maintain favored status: achieved Black Belt in ten months, state championship (for age/weight group) six months later. Was considered probable national championship material, possibly world. Enjoyed: great fun, terrific physical conditioning, obvious potential value (ask Filthy Four), good for ego due to adulation over ever-lengthening string of successes, capture of state loving cup (ironic misnomer—contest was mock combat: “killed” seven opponents, “maimed” 22 others for life or longer).

But purely incidental in no way distracted from main purpose:

With aid of Master (addressed as Teacher away from *dojo*) had absorbed equivalent of advanced high school education, some college by time world ended: Math through calculus, chemistry, beginnings of physics; good start on college biology, life sciences—doing well.

Occasionally caught Teacher regarding me as hen puzzler over product of swan egg slipped into nest: making notes in “Tarzan File” (unresolved enigma: huge file, never explained; partially concerned me, as achievements frequently resulted in entries, but was 36 inches thick before I entered picture), but definitely approved—and his approval better for ego than state cup.

Regarding which, had by then achieved Fifth Degree: could break brick with edge of hand, knee, foot. But didn't after learned could. Prospect dis-

tressed Daddy. Poor dear could visualize with professional exactitude pathological consequences of attempt by untrained: knew just what each bone splinter would look like, where would be driven; which tendons torn from what insertions; which nerves destroyed forever, etc. Had wistful ambition I might follow into medicine; considered prospects bleak for applicant with deformed, calloused hammers dangling from wrists.

Needless concern: callouses unnecessary. With proper control, body delivers blow through normal hands without discomfort, damage. Is possible, of course, to abuse nature to point where fingers, knuckles, edge of hands, etc., all turn to flint, but never seen outside exhibitions. Serves no purpose in practice of art: regarded with disdain by serious student, Master alike.

So much for happy memories.

Not long ago world situation took turn for worse. Considering character of usual headlines when change began, outlook became downright grim. Daddy tried to hide concern but spent long hours reading reports from Washington (appreciated for first time just how renowned was when saw whom from), watching news; consulting variety of foreign, domestic officials by phone. Seemed cheerful enough, but when thought I wasn't looking, mask slipped.

Finally called me into study. Sat me down; gave long, serious lecture on how bad things were. Made me lead through house, point out entrances to emergency chute leading down to shelter (dreadful thing—200 foot vertical drop in pitch dark, cushioned at bottom only by grad-

ual curve as polished sides swing to horizontal, enter shelter). Then insisted we take plunge for practice. Although considered "practice" more likely to induce psychic block, make subsequent use impossible—even in time of need—performed as requested. Not as bad as expected: terror index fell perhaps five percent short of anticipation. But not fun.

However, first time in shelter since age three. Scenic attractions quickly distracted from momentary cardiac arrest incurred in transit. Concealed below modest small-town frame house of unassuming doctor was Eighth Wonder of World. Shelter is three-story structure carved from bedrock, 100 feet by 50; five-eighths shelves, storage compartments. Recognized microfilm viewer immediately; identical to one used at big hospital over in next county. Film storage file cabinets same, too—only occupied full length of two long walls, plus four free-standing files ran almost full length of room. Rest bookshelves, as is whole of second floor. Basement seems mostly tools, machinery, instrumentation.

Hardly heard basic life-support function operation lecture: air regeneration, waste reclamation, power production, etc. Was all could do to look attentive—books drew me like magnet. However, managed to keep head; paid sufficient attention to ask intelligent-sounding questions. Actually learned basics of how to work shelter's vital components.

. . . Because occurred to me: Could read undisturbed down here if knew how to make habitable. (Feel bad about that, too; here Daddy worried sick over

my survival In The Event Of—and object of concern scheming about continuing selfish pursuit of printed word.)

Tour, lecture ended. Endless spiral staircase up tube five feet in diameter led back to comfortable world of small-town reality. Life resumed where interrupted.

With exception: Was now alert for suitable opportunity to begin exploration of shelter.

Not readily available. As Fifth was qualified assistant instructor at formal classes; took up appreciable portion of time. Much of rest devoted to own study—both Art (wanted to attain Sixth; would have been youngest in world) and academics, both under approving eye of Master. Plus null time spent occupying space in grammar school classroom, trying not to look too obviously bored while maintaining straight-A average (only amusement consisted of correcting teachers, textbooks—usually involved digging up proof, confrontations in principal's office). Plus sundry activities rounding out image of "normally well-rounded" 11-year-old.

But patience always rewarded. If of sufficient duration, Daddy called to Washington; agreed was adult enough to take care of self, house. Terry during three days' expected absence. Managed not to drool at prospect.

Terry? True, didn't mention before, by name; just that had responsibility. Remember? First page, fourth paragraph. Pay attention—may spring quiz.

Terry is retarded, adoptive twin brother. Saw light of day virtually same moment I emerged—or would have had opened eyes. Early on showed more promise than I: Walked at nine weeks,

first words at three months, could fly at 14 weeks. Achieved fairly complex phrases by six months but never managed complete sentences. Peaked early but low.

Not fair description. Actually Terry is brilliant—for macaw. Also beautiful. Hyacinthine Macaw, known to low-brows as Hyacinth, pseudo-intellectuals as *Anodorhynchus hyacinthinus*—terrible thing to say about sweet baby bird. Full name Terry D. Foster (initial stands for Dactyll). Length perhaps 36 inches (half of which is tail feathers); basic color rich, glowing hyacinth blue (positively electric in sunlight), with bright yellow eye patches like clown, black feet and bill. Features permanently arranged in jolly Alfred E. Newman, village-idiot smile. Diet is anything within reach, but ideally consists of properly mixed seeds, assorted fruits, nuts, sprinkling of meat, etc.

Hobbies include getting head and neck scratched (serious business, this), art of conversation, destruction of world. Talent for latter avocation truly awe-inspiring: 1,500 pounds pressure available at business end of huge, hooked beak. Firmly believe if left Terry with four-inch cube of solid tungsten carbide, would return in two hours to find equivalent mass of metal dust, undimmed enthusiasm.

Was really convinced were siblings when very young. First deep childhood trauma (not affected by loss of blood parents; too young at time, too many interesting things happening) induced by realization was built wrong, would never learn to fly. Had stubbornly mastered perching on playpen rail shortly after began walking (though never did

get to point of preferring nonchalant one-legged stance twin affected—toes deformed: stunted, too short for reliable grip), but subsequent step simply beyond talents.

Suspect this phase of youth contributed to appearance of symptoms leading to early demise of Momma Foster. Remember clearly first time she entered room, found us perched together on rail, furiously “exercising wings.” Viewed in retrospect, is amazing didn’t expire on spot.

(Sounds cold, unfeeling; is not. Momma given long advance notice; knew almost to day when could expect to leave. Prepared me with wisdom, understanding, love. Saw departure as unavoidable but wonderful opportunity, adventure; stated was prepared to accept, even excuse reasonable regret over plans spoiled, things undone—but not grief. Compared grief over death of friend to envy of friend’s good fortune; selfish reaction—feeling sorry for self, not friend. Compared own going to taking wonderful trip; “spoiled plans” to giving up conflicting movie, picnic, swim in lake. Besides, was given big responsibility—charged me with “looking after Daddy.” Explained he had formed many elaborate plans involving three of us—many more than she or I had. Would doubtless be appreciably more disappointed, feel more regret over inability to carry out. Would need love, understanding during period it took him to reform plans around two remaining behind. Did such a job on me that truly did not suffer loss, grief; just missed her when gone, hoped was having good time.)

Awoke morning of Daddy’s trip to

startling realization—didn't want him to go. Didn't like prospect of being alone three days; didn't like idea of *him* alone three days. Lay abed trying to resolve disquieting feeling. Or at least identify. Could do neither; had never forebode before. Subliminal sensation: below conscious level but intrusive. Multiplied by substantial factor could be mistaken for fear—no, not fear, exactly; more like mindless, screaming terror.

But silly; nothing to be scared about. Mrs. Hartman could be working in office in front part of house during day; house locked tight at night—with additional security provided by certain distinctly non-small-town devices Daddy recently caused installed. Plus good neighbors on all sides, available through telephone right at bedside or single loud scream.

Besides, was I not Candy Smith-Foster, *State Champion, Scourge of Twelve-and-Under Class*, second most dangerous mortal within 200-mile radius? (By now knew details of Filthy Four's "stumble," and doubt would have gotten off so lightly had I been intercessor.)

Was. So told feeling to shut up. Washed, dressed, went down to breakfast with Daddy and Terry.

Conduct during send-off admirable; performance qualified for finals in stiff-upper-lip-of-year award contest. Merely gave big hug, kiss; cautioned stay out of trouble in capital, but if occurred, call me soonest—would come to rescue: split skulls, break bones, mess up adversaries something awful. Sentiment rewarded by lingering return hug, similar caution about self during absence (but expressed with more dignity).

Then door of government-supplied, chauffeur-driven, police-escorted limousine closed; vehicle made its long, black way down street, out of sight around corner.

Spent morning at school, afternoon teaching at Y, followed by own class with Master. Finally found self home, now empty except Terry (voicing disapproval of day's isolation at top of ample lungs); Mrs. Hartman done for day, had gone home. Silenced twin by scratching head, transferring to shoulder (loves assisting with household chores, but acceptance means about three times as much work as doing by self—requires everything done at arms' length, out of reach).

Made supper, ate, gave Terry whole tablespoon of peanut butter as compensation for boring day (expressed appreciation by crimping spoon double). Did dishes, cleaned house in aimless fashion; started over.

Finally realized was dithering, engaging in busywork; afraid to admit was really home alone, actually had opportunity for unhindered investigation of shelter. Took hard look at conflict; decided was rooted in guilt over intent to take advantage of Daddy's absence to violate known wishes. Reminded self that existence of violation hinged upon accuracy of opinion concerning unvoiced desires; "known wishes" question-begging terminology if ever was one. Also told self firmly analysis of guilt feeling same as elimination. Almost believed.

Impatiently stood, started toward basement door. Terry recognized signs, set up protest against prospect of evening's abandonment. Sighed, went back,

transferred to shoulder. Brother rubbed head on cheek in gratitude, gently bit end of nose, said, "You're so bad," in relieved tones. Gagged slightly; peanut-butter breath from bird is rare treat.

Descended long spiral stairs down tube to shelter. Ran through power-up routine, activated systems. Then began exploration.

Proceeded slowly. Terry's first time below; found entertaining. Said, "How 'bout that!" every ten seconds. Also stretched neck, bobbed head, expressed passionate desire to sample every book as pulled from shelf. Sternly warned of brief future as gilet dressing if so much as touched single page. Apparently thought prospect sounded fun, redoubled efforts. But was used to idiot twin's antisocial behavior; spoiled fun almost without conscious thought as proceeded with exploration.

Soon realized random peeking useless; was in position of hungry kid dropped in middle Willy Wonka's Chocolate Factory: Too much choice. Example: Whole cabinet next to micro-film viewer was *catalog*!

Three feet wide, eight high; drawers three feet deep, six inches wide (rows of six); ten titles per card (*thin* cards)—72 cubic feet of solid catalog.

Took breath away to contemplate. Also depressed; likelihood of mapping orderly campaign to augment education not good. Didn't know where to start; which books, films within present capacity; where to go from there. Only thing more tiresome than being repressed genius is being ignorant genius recognizing own status.

Decided to consult Teacher; try to get him to list books he considered ideal to

further education most rapidly from present point, cost no object. (Was giving consideration to Daddy's ambition to see me become doctor; but regardless, no education wasted. Knowledge worthwhile for own sake.) Didn't feel should report discovery—would be breach of confidence—but could use indirect approach. Not lie; just not mention that any book suggested undoubtedly available on moment's notice. Ought to fool him all of ten seconds.

Started toward switchboard to power-down shelter. Hand touching first switch in sequence when row of red lights began flashing, three large bells on wall next to panel commenced deafening clangor. Snatched hand back as if from hot stove; thought had activated burglar alarm (if reaction included thought at all). Feverish inspection of panel disclosed no hint of such, but found switch marked "Alarm Bells, North American Air Defense Command Alert." Opened quickly; relieved to note cessation of din, but lights continued flashing. Then, as watched, second row, labeled, "Attack Detected," began flashing.

Problem with being genius is tendency to think deep, mull hidden significance, overlook obvious. Retrieved Terry (as usual, had gone for help at first loud noise), scratched head to soothe nerves. Twin replied, "That's *bad*!" several times; dug claws into shoulder, flapped wings to show had not really been scared. Requested settle down, shut up; wished to contemplate implications of board.

Impressive. Daddy must be truly high-closet VIP to rate such inside data supplied to home shelter. As considered this, another row flashed on, this la-

beled. "Retaliation Initiated." Imagine—blow-by-blow nuclear war info updates supplied to own home! Wonderful to be so important. Amazing man. And so modest—all these years never let on. Wondered about real function in government. With such brains was probably head of super-secret spy bureau in charge of dozens of James Bond types.

Don't know how long mindless rumination went on: finally something clicked in head: Attack? Retaliation? *Hey . . .* ! Bolted for steps. Terry dug in claws, voiced protest over sudden movements.

Stopped like statue. Daddy's voice, tinny, obviously recording: "Red alert, radiation detected. Level above danger limit. Shelter will seal in 30 seconds—29, 28, 27" Stood frozen; listened as familiar voice delivered requiem for everything known and loved—including probably self. Interrupted count once at 15-second mark to repeat radiation warning, again at five seconds.

Then came deep-toned humming: powerful motors slid blocks of concrete, steel, asbestos across top of stairwell, did same for emergency-entry chute. Sealing process terminated with solidly mechanical clunks, thuds. Motors whined in momentary overload as program ensured was tight.

Then truly alone. Stood staring at nothing for long minutes. Did not know when silent tears began; noticed wet face when Terry sampled, found too salty. Shook head; said softly, "Poooor bay-bee-ee"

Presently found self sitting in chair. Radio on; could not remember turning switch, locating CONELRAD frequency. Just sat, listened to reports.

Only time stirred was to feed, water Terry; use potty. Station on air yet, but manned only first three days.

Was enough, told story: Mankind eliminated. Radiation, man-made disease. International quick-draw ended in tie.

Final voice on air weakly complained situation didn't make sense: Was speaking from defense headquarters near Denver—miles underground, utterly bombproof, airtight; self-contained air, water—so why dying? Why last alive in entire installation? Didn't make sense

Agreed, but thought objection too limited in scope. Also wondered why we were still alive. Likewise didn't make sense.

If invulnerability of NORAD headquarters—located just this side of Earth's core under Cheyenne Mountain—proving ineffective, how come fancy subcellar hidey-hole under house in small town still keeping occupants alive? And for how long? Figured had to be just matter of time.

Therefore became obsessed with worry over fate of retarded brother. Were safe from radiation (it seemed), but plague another matter. Doubted would affect avian biochemistry; would kill me, leave poor baby to starve, die of thirst. Agonized over dilemma for days. Finally went downstairs; hoped might turn up something in stores could use as Terry's Final Friend.

Did. Found armory. Thought of what might have to do almost triggered catatonia; but knew twin's escape from suffering dependent on me, so mechanically went ahead with selection of shotgun. Found shells, loaded gun. Carried

upstairs, placed on table. Then waited for cue.

Knew symptoms; various CONELRAD voices had described own, those of friends. Were six to syndrome. Order in which appeared reported variable: number present at onset of final unconsciousness not. Four symptoms always; then fifth: period of extreme dizziness—clue to beginning of final decline. Was important, critical to timing with regard to Terry. Desperately afraid might wait too long; condemn poor incompetent to agonizing last days. And almost more afraid might react to false alarm, proceed with euthanasia; then fail to die—have to face scattered, blood-spattered feathers, headless body of sweetest, jolliest, most devoted, undemandingly loving friend had ever known.

Which was prospect if acted too soon—intended to stand 20 feet away, blow off head while engrossed in peanut butter. Pellet expansion sufficient at that distance to ensure virtually instantaneous vaporization of entire head, instant kill before possibility of realization, pain. Would rather suffer own dismemberment, boiling in oil than see innocent baby suffer, know was me causing.

Thus, very important to judge own condition accurately when plague sets in.

Only hasn't yet. Been waiting three weeks, paralyzed with grief, fear, apprehension, indecision. But such emotions wearisome when protracted; eventually lose grip on victim. I think perhaps might have—particularly now that journal up to date, catharsis finished. Book says therapy requires good night's sleep after spilling guts; then

feel better in morning. Suspect may be right; do feel better.

Okay. Tomorrow will get *organized* . . . !

Good morning, Posterity! Happy to report I spent good night. Slept as if already dead—first time since trouble began. No dreams; if tossed, turned, did so without noticing. Appears writer of psychology text knew stuff (certainly should have; more letters following name than in). Catharsis worked—at least would seem; felt good on waking. Wounds obviously not healed yet, but closed. A beginning—scabs on soul much better than hemorrhage.

Situation unchanged; obviously not happy about fact (if were would know had slipped cams), but this morning can look at Terry without bursting into tears; can face possibility might have to speed birdbrained twin to Reward before own condition renders unable. Thought produces entirely reasonable antipathy, sincere hope will prove unnecessary—but nothing more.

Despairing paralysis gone; mind no longer locked into hopeless inverse logarithmic spiral, following own tail around ever-closer, all-enveloping fear of ugly possibility.

Seems have regained practical outlook held prior to Armageddon; i.e., regard worry as wasteful, contra-productive if continued after recognition, analysis of impending problem, covering bases to extent resources permit. Endless bone-worrying not constructive exercise; if anything, diminishes odds for favorable outcome by limiting scope of mind's operation, cuts down opportunities for serendipity to lend hand.

Besides, takes fun out of life—especially important when little enough to be had.

Time I rejoined world of living (possibly not most apt choice of words—hope do not find am in exclusive possession). First step: consider physical well-being. Have sadly neglected state of health past three weeks: mostly just sat in chair, lay abed listening to airwaves hiss.

And speaking of physical well-being—has just occurred: am ravenous! Have nibbled intermittently without attention to frequency, content—mostly when feeding, watering Terry. (Regardless of own condition, did *not* neglect jovial imbecile during course of depression. Even cobbled up makeshift stand from chair, hardwood implement handle; found sturdy dishes, secured firmly to discourage potential hilarity. Granted, diet not ideal—canned vegetables, fruits, meat, etc.—but heard no complaints from clientele, and would be no doubt if existed: Dissatisfaction with offerings usually first indicated by throwing on floor; if prompt improvement not forthcoming, abandons subtlety.)

Have also noticed am *filthy*! Wearing same clothes came downstairs in three weeks ago. Neither garments nor underlying smelly germ farm exposed to water, soap, deodorant since. (Can be same fastidious Candy Smith-Foster who insists upon shower, complete change of clothing following any hint of physical exertion, contact with even potentially soiled environment? Regrettably is.) And now that am in condition to notice—*have*! Self-respecting maggot would take trade elsewhere.

So please excuse. Must rectify immediately. Bath (probably take three,

four complete water changes to do job); then proper meal, clean clothes. Then get down to business. Time to find out about contents of shelter—availability of resources relevant to problems.

Be back later . . .

Apologies for delay, neglect. But have been so *busy*!

Bath, resumption of proper nutrition completed cure. Spirits restored; likewise determination, resourcefulness, curiosity (intellectual variety: am not snoop—rumors to contrary). Also resumed exercises, drills (paid immediate penalty for three-week neglect of Art—first attempt at usual *kata* nearly broke important places, left numerous sore muscles.)

Have systematically charted shelter. Took pen, pad downstairs to stores, took inventory. Then went through bookshelves in slow, painstaking manner: recorded titles, locations of volumes applicable to problems. Project took best part of three days. Worth effort: variety, volume of equipment simply awesome. Together with library probably represents everything necessary for singlehanded founding of bright new civilization—from scratch, if necessary. (Not keen on singlehanded part, however: sounds lonely. Besides, know nothing about Applied Parthogenesis: not merit badge topic in scouts. Only memory of subject's discussion concerned related research—was no-no: leader claimed caused myopia, acne, nonspecific psychoses. Oh, well, considering age, prospects for achieving functional puberty, seems less than pressing issue.)

Speaking of pressing issues, how-

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ever—found *food*. Founder of civilization will certainly eat well in interim. Must be five-year supply of frozen meat, fruit, fresh vegetables in deep-freeze locker adjoining lower level (huge things—50 feet square). Stumbled upon by accident: door wasn't labeled. Opened during routine exploration expecting just another bin. Light came on illuminating scenery—almost froze tip of nose admiring contents before realized was standing in 50-degree-below-zero draft. Also good news for Terry: Daddy anticipated presence: lifetime supply of proper seed mix in corner bin. Will keep forever: too cold to hatch inevitable weevil eggs, etc.

Actually haven't minded canned diet: good variety available—but sure was nice to drop mortally-peppered steak onto near-incandescent griddle, inhale fumes as cooked: then cut with fork while still bleeding inside charred exterior. Of course had to fight Terry for share: may be something likes better, but doesn't come readily to mind.

Is regrettable this could be part of Last Words: means must exercise honesty in setting down account. Bulk of organized theologies I've read opine dying with lie upon lips bodes ill for direction of departure. Since can be no doubt of Terry's final Destination, must keep own power dry. Twin would be lonely if got There without me—besides, without watching would announce presence by eating pearls out of Gate.

So despite self-serving impulses, must record faithfully shameful details of final phase in monumental inventory: assault upon card file. Intended to make painstaking, card-by-card inspection of microfilm catalog (vastly more exten-

sive than bound collection), recording titles suggesting relevance to problems. Grim prospect: 72 cubic feet holds dreadful quantity of cards—each with ten titles. Even considering own formidable reading speed, use of Pitman for notes, seemed likely project would account for substantial slice of remaining lifespan—even assuming can count upon normal duration.

However, could see no other way: needed information. So took down first drawer (from just below ceiling, of course: but thoughtful Daddy provided rolling ladder as in public stacks), set on table next to notepad. Sighed, took out first card, scanned—stopped, looked again. Pulled out next 20, 30: checked quickly. Made unladylike observation regarding own brains (genius, remember?). Reflected (after exhausted self-descriptive talents) had again underestimated Daddy.

Humble healer, gentle father was embodiment of patience—but had none with unnecessary inefficiency. Obviously would have devised system to locate specifics in such huge collection. Useless otherwise: researcher could spend most of life looking for data instead of using.

First 200 cards index of *index*. Alphabetically categorized, cross-referenced to numbered file locations. Pick category, look up location in main file: check main file for specific titles, authors: find films from specific location number on individual card. Just like downtown.

So after settled feathers from self-inflicted wounds (ten well-deserved lashes with sharp tongue), got organized. Selected categories dealing with situation:

referred to main index; decided upon specific films, books. Cautioned Terry again about gliblet shortage, dug out selections. Settled down to become expert in nuclear warfare, viral genocide: construction details, complete operation of shelter systems.

Have done so. Now know exactly what happened. Every ugly detail. Know which fissionables used, half-life durations; viral, bacterial agents employed; how deployed, how long remain viable threats without suitable living hosts. Know what they used on us—vice versa. Found Daddy's papers dealing with secret life.

Turns out was heavyweight government consultant. Specialty was countering biological warfare. Privy to highest secrets; knew all about baddest bugs on both sides. Knew how used, counter-measures most effective—personally responsible for development programs aimed at wide-spectrum etiotropic counteragents. Also knew intimate details of nuclear hardware poised on both sides of face-off. Seems had to: radiation level often key factor. In many cases *benign virus*, bacteria turned instantaneously inimical upon exposure to critical wavelengths. Only difference between harmless tourist and pathogen: Soothing counsel transmitted from pacific gene in DNA helix to cytoplasmic arsenal by radiation-vulnerable RNA messenger. Enter energy particle flood, exit restraint; hello Attila the Germ. Clever these mad scientists.

Undoubtedly how attack conducted—explains, too, fall of hermetically sealed NORAD citadel. Entire country seeded over period of time with innocuous first-stage organisms until sufficiently wide-

spread. Then special warheads—carefully spaced to irradiate every inch of target with critical wavelength—simultaneously detonated at high altitude across whole country. Bombs dropping vertically from space remained undetected until betrayed by flash—by which time too late: radiation front travels just behind visible light. Not a window broken but war already over: Everybody running for shelter already infected, infectious with at least one form of now-activated, utterly lethal second-stage plague. Two, three days later—all of them dead.

Supposed to be another file someplace down here detailing frightful consequences to attackers; haven't found yet. Only mention in this one suggests annihilation even surer, more complete among bad guys—and included broken windows.

Tone of comment regretful. Not sure can agree. True, most dead on both sides civilians—but are truly innocent? Who permitted continuing rule by megalomaniacs? Granted, would have been costly for populace to throw incumbent rascals out, put own rascals in—but considering cost of failure in present light . . .

Must give thought before passing judgment.

Enough philosophy.

Have learned own tactical situation not bad. No radiation detectable on surface, immediate area (instrumentation in shelter; sensors upstairs on roof of house—part of TV antenna). Not surprising: According to thesis, nuclear stuff to be used almost exclusively as catalyst for viral, bacterial invaders. Bursts completely clean—no fallout at

all—high enough to preclude physical damage. Exception: Direct hits anticipated on known ICBM silos, SAC bases, Polaris submarines, bomber-carrying carriers, overseas installations—and Washington . . .

Where Daddy went. Hope was quick, clean.

Plague another question entirely. Daddy holds opinion infection of target country self-curing. No known strain in arsenals of either side capable of more than month's survival outside proper culture media; i.e., living human tissue (shudder to contemplate where, how media obtained for experimentation leading to conclusion). Odds very poor such available longer than two, three days after initial attack; therefore should be only another week before is safe to venture outside, see what remains of world. However, wording, " . . . should be . . . " erodes confidence in prediction; implies incomplete data, guesswork—*gamble*. Considering stake involved is own highly regarded life, placing absolute reliance on stated maximum contagion parameters not entirely shrewd policy.

So shan't. Now that can get out whenever wish, no longer have such pressing need to: claustrophobic tendencies gone. Shelter quite cozy (considering): Dry, warm, plumbing, furniture; great food (brilliantly prepared), safe water; good company, stimulating conversation ("Hello, baby! What'cha doin'?" You're so bad! Icky *pooh!*"); plus endless supply of knowledge. Delay amidst such luxury seems small price for improved odds. So will invest extra two months as insurance.

Figure arbitrary; based on theory that

treble safety factor was good enough for NASA, should be good enough for me. (Of course theory includes words "should be" again, but must draw line somewhere.)

And *can* get out when ready. Easy: Just throw proper switches. All spelled out in detailed manual on shelter's systems, operation. Nothing to it. Just pick up book, read. After finding. After learning exists in first place. (Daddy could have reduced first three weeks' trauma had bothered to mention, point out where kept—on other hand, had learned how to get out prior to absorbing details on attack, would doubtless be dead now.)

Makes fascinating reading. Shelter eloquent testimonial to wisdom of designer. Foresight, engineering brilliance embodied in every detail. Plus appalling amount of money, shameless level of political clout. Further I got into manual, more impressed became. Is NORAD headquarters miniaturized, improved; hermetically sealed; air, water, wastes recycled; elaborate communications equipment; sophisticated sensory complex for radiation, electronics, detection, seismology, medicine. Power furnished by nuclear device about size of Volkswagen—classified, of course (talk about clout?). Don't know if works; supposed to come on automatically when municipal current fails. But according to instruments am still running on outside power.

Let's see—nope; seems to be about everything for now. Will update journal as breathtaking developments transpire.

Hi. One-month mark today. Breathless developments to date:

1. Found stock of powdered milk: awful. Okay in soup, chocolate, cooking, etc., but alone tastes boiled.

2. Discovered unplugged phone in hitherto-unnoticed cabinet. Also found jack. Plugged in, found system still working. Amused self by ringing phones about country—random area codes, number. But no answers, of course; and presently noticed tears streaming down face. Decided not emotionally healthy practice. Discontinued.

3. Employed carpentry tools, pieces of existing makeshift accommodation to fabricate proper stand for brother. Promptly demonstrated gratitude by chewing through perch (which had not bothered for whole *month!*). Replaced with thick, hardwood sledge handle: sneered, dared him try again. Have thereby gained temporary victory: Fiend immediately resumed game but achieving little progress. Wish had stands from upstairs in house. Are three, all 11 years old—still undamaged (of course, perches consist of hard-cured, smooth-cast concrete—detail possibly relevant to longevity).

Guess that's it for now. Watch this space for further stirring details.

Two months—hard to believe not millenia. Einstein correct: Time *is* relative. Hope doesn't get more so; probably stop altogether. Have wondered occasionally if already hasn't.

Not to imply boredom. Gracious, how could be bored amidst unremitting pressure from giddy round of social activities? For instance, just threw gala party to celebrate passing of second month. Was smash, high point of entombment, sensation of sepulchral so-

cial schedule. Went all out—even invited Terry (desperately relieved to find invitee able to squeeze event into already busy whirl of commitments).

First class event: Made cake, fried chicken thighs, broiled small steak; even found ice cream. All turned out well. Preferred steak, cake myself; honored guest chose ice cream (to eyebrows), chicken bones (splits shafts, devours marrow—possibly favoritest treat of all). No noisemakers in inventory (*gross oversight*), but assemblage combined efforts to compensate. At peak of revelry birdbrain completed chewing through perch. Was standing on end at time, of course; accepted downfall with pride, air of righteous triumph. Then waddled purposefully in direction of nearest chair leg. Had to move fast to dissuade.

Replaced perch.

Also have read 104 microfilmed books, regular volumes. Am possibly world's foremost living authority on everything.

As if matters.

Later.

Ever wanted something so bad could almost taste, needed so long seemed life's main ambition? Finally got—wished hadn't?

You guessed: Three months up—*finally!*

Went upstairs, outside. Stayed maybe two hours. Wandered old haunts: familiar neighborhood, Main Street shopping area, Quarry Lake Park, school, Y, etc.

Should have quit sooner: would, had understood nature of penalty accruing. By time got back was already too late;

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trembling all over, tears running down face. Scabs all scraped from wounds; worms awake, gnawing soul. In parlance of contemporaries-past: Was bad trip.

However, conditions outside are fact of life, something must face. Must overcome reaction unless intend to spend balance of years simulating well-read mole. Nature works slowly, methods unesthetic; tidying up takes years. Inescapable; must accept as is; develop blind spot, immunity. Meanwhile will just have to cope best I can with resulting trauma each time crops up until quits cropping.

Well, coping ought to be no problem. Catharsis worked before, should again. But wish were some other way. No fun; hurts almost as much second time around. But works—and already learned cannot function with psyche tied in knots. So time to quit stalling. “Sooner started, sooner done; sooner outside, having fun.”—Anon. (Understandably.)

Only just *can't* right now. Not in mood; still hurting from initial trauma. Guess I'll go read some more. Or pound something together with hammer.

Or apart.

Later.

Okay. Feel no better yet, but feel less bad. Is time got on with therapy.

Suspect current problems complicated by *déjà vu*. Still retain vivid mental picture of body of Momma Foster minutes after pronounced dead. Bore physical resemblance to warm, wise, vital woman whose limitless interests, avid curiosity, ready wonderment, hearty enjoyment of existence had so enriched early years.

But body not person—person *gone*. Resemblance only underscored absence.

So too with village: Look quick, see no difference. Bears resemblance to contentedly industrious, unassuming, small farm town of happy childhood. Same tall, spreading trees shade same narrow streets; well-kept, comfortably ageless old homes. Old-fashioned street lights line Main Street's storefront downtown business district, unchanged for 50 years, fronting on classic village square. Hundred-year-old township building centered in square amidst collection of heroic statues. World War One mementos, playground equipment: brightly-painted, elevated gazebo for public speakers. Look other direction down street, see own ivy-covered, red-brick school at far end, just across from Y. Next door, Teacher's house looks bright, friendly, inviting as ever in summer-afternoon sunshine.

But open door, step out onto porch—illusion fades. Popular fallacy attends mystique of small towns: Everyone knows are “quiet.” Not so; plenty of noise, but right kind—comfortable, unnoticed.

Until gone.

Silence is shock. Is wrong, but takes whole minutes to analyze *why* wrong; identify anomalous sensation, missing input.

Strain ears for hint of familiar sound: Should be faint miasma of voices, traffic sounds drifting up from direction of Main Street; chatter, squeals, laughter from schoolyard. Too, is truly small town, farmlands close at hand; should hear tractors chugging in fields, stock calling from pastures. Should catch fre-

quent hollow mutter as distant semi snores down highway past town; occasional, barely-perceptible rumble from jet, visible only as fleecy tracing against indigo sky. Should be all manner of familiar sounds.

But as well could be heart of North Woods; sounds reaching ear limited to insect noises, bird calls, wind sighing through leaves.

Visual illusion fades quickly, too. Knee-deep grass flourishes where had been immaculately groomed yards; straggly new growth bewhiskers hedges, softening previous mathematically-exact outlines. Houses up and down street show first signs of neglect: Isolated broken windows, doors standing open, missing shingles. Partially uprooted tree leans on Potter's house, cracking mortar, crushing eaves, sagging roof. Street itself blocked by car abandoned at crazy angle; tire flat, rear window broken, driver's door hanging open. Closer inspection shows Swensens' pretty yellow-brick Cape Cod nothing but fire-gutted shell; roof mostly gone, few panes of glass remain, dirty smudge marks above half-consumed doors and windows; nearby trees singed.

And the *smell* . . . ! Had not spent last three months sealed in own atmosphere, doubt could have remained in vicinity. Still strong enough outside to dislodge breakfast within moments of first encounter. And did. Happily, human constitution can learn to tolerate almost anything if must. By time returned to shelter, stench faded from forefront of consciousness—had other problems more pressing:

Learned what knee-deep lawns conceal. Three months' exposure to Wis-

consin summer does little to enhance cosmetic aspects of Nature's embalming methods: Sun, rain, insects, birds, probably dogs, too, have disposed of bulk of soft tissues. What remains is skeletons (mostly scattered, incomplete, partially covered by semi-cured meat, some clothing). Doubtless would have mummified completely by now in dry climate, but Wisconsin summers aren't. At best, results unappealing; at worst (first stumbled over in own front yard), dreadful shock.

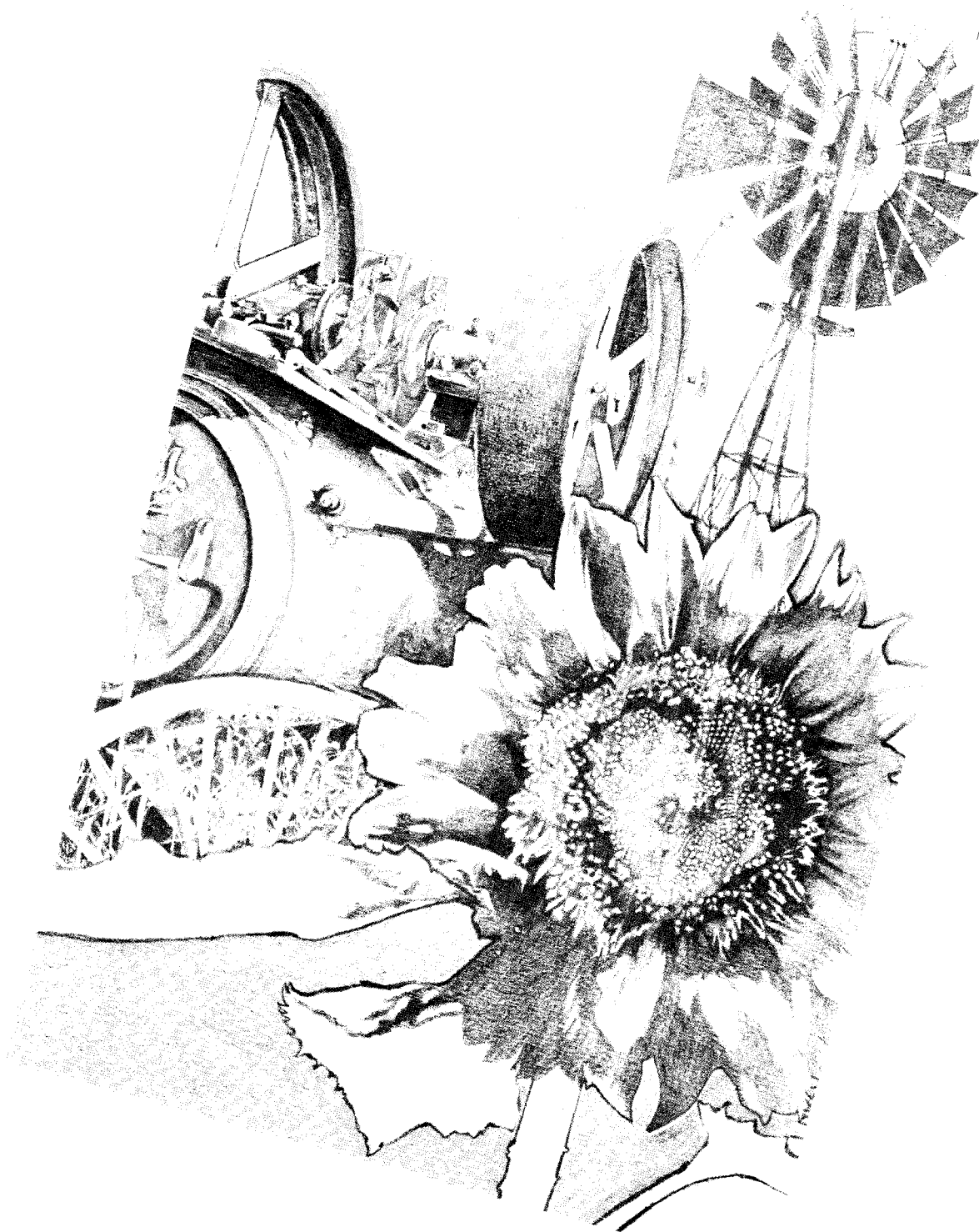
Yes, I know; should have anticipated. Possibly did, in distant, nonpersonally-involved sort of way—but didn't expect to find three bodies within ten feet of own front door! Didn't expect to confront dead neighbors within three minutes after left burrow. Didn't expect so *many*! Thought most would be respectably tucked away indoors, perhaps in bed. That's where I'd be, I think.

Well, lived through initial shock, continued foray. Was not systematic exploration; just wandered streets, let feet carry us at random. Didn't seem to matter: same conditions everywhere. Pecked into houses, stores, cars; knocked on doors, hollered a lot.

Wasn't until noticed twin digging in claws, flapping wings, protesting audibly that realized was running blindly, screaming for somebody—*anybody*!

Stopped then, streaming tears, trembling, panting (must have run some distance); made desperate attempt to regain semblance of control. Dropped where stood, landed in lotus. Channeled thoughts into relaxation of body, achievement of physical serenity; hoped psyche would heed good example.

Did—sort of. Worked well enough.



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at least, to permit deliberate progress back to shelter, deliberate closing door, deliberate descent of stairs, deliberate placing of Terry on stand—all before threw screaming fit.

Discharged lots of tension in process, amused Terry hugely. By end of performance link sibling was emulating noises. Ended hysteria in laughter. Backwards, true, but effective.

Recovered enough to make previous journal entry. Granted, present (therapeutic) entries beyond capacity at that point; but after spent balance of day licking wounds, night's rest, was fit enough to make present update, discharge residual pain onto paper.

Amazing stuff, therapy: still not exactly looking forward to going outside again, but seem to have absorbed trauma of dead-body/deserted-city shock; adjusted to prospect of facing again. Forewarned, should be able to go about affairs, function effectively in spite of surroundings.

Which brings up entirely relevant question: Exactly what *are* my affairs, functions . . . ? Now that am out, what to do? Where to go? What to do when get there? Why bother go at all?

Okay, fair questions. Obviously prime objective is find Somebody Else. Preferably somebody knowing awful lot about Civilizations. Founding & Maintenance Of—to say nothing of where to find next meal when supplies run out.

Certainly other survivors. Somewhere. So must put together reasonable plan of action based on logical extension of available data. Sounds good—uh, except, what *is* available data?

Available data: *Everybody* exposed to flash, to air at time of flash, to any-

body else exposed to flash or air exposed to flash or to anybody exposed to anybody, etc., either at time of flash or during subsequent month, anywhere on planet, is dead. Period.

Shucks. Had me worried: thought for moment I had problem. Ought be plenty survivors: modern civilization replete with airtight refuges: nuclear submarines, hyperbaric chambers, space labs, jet transports, "clean assembly" facilities, many others (not to forget early-model VW beetles, so long as windows closed). Ought be many survivors of flash, initial contagion phase.

But—loaded question—how many knew enough: stayed tight throughout required month? Or got lucky, couldn't get out too soon despite best efforts? Or with best intentions, had supplies, air for duration? Or survived emotional ravages; resisted impulse to open window, take big, deliberate breath?

Could employ magnet to find needle in haystack; easy by comparison. Real problem is: *Is needle in there at all?*

Well, never mind; leave for subconscious to mull. Good track record heretofore; probably come up with solution, given time.

Other, more immediate problems confronting: For one, must think about homestead. Can't spend balance of years living underground. Unhealthy; leads to pallor. Besides, doubt is good for psyche; too many ghosts.

Where—no problem for short term; can live just about anywhere warm, dry. Adequate food supplies available in shelter, stores, home pantries, etc.; same with clothing, sundry necessities. Can scavenge for years if so inclined.

However, assuming residential ex-

clusivity continues (and must take pessimistic view when planning), must eventually produce own food, necessities; become self-sufficient. Question is: Should start now or wait: hope won't prove necessary?

Not truly difficult decision: longer delayed, more difficult transition becomes. Livestock factor alone demands prompt attention. Doubtless was big die-off over summer. Too stupid to break out of farms, pastures, search for water, feed, most perished—"domestic" synonym for "dependent." But of survivors, doubt one in thousand makes it through winter unaided. Means if plan to farm, must round up beginning inventory before weather changes. Also means must have food, water, physical accommodations ready for inductees beforehand.

Means must have farm.

However, logic dictates commandeering farm relatively nearby. Too much of value in shelter; must maintain reasonable access. Availability of tools, books, etc., beneficial in coming project: provisioning, repairing fences, overhaul well-pumps, etc.

Plus work needed to put house in shape for winter. Wisconsin seasons rough on structures: characteristic swayback rooflines usually not included in builder's plan, zoning regulations. After summer's neglect, buildings of farm selected apt to need much work—none of which am qualified to do. Expect will find remainder of summer, fall highly educational, very busy.

So perhaps should quit reflecting on plans, get move on. Best reconnoiter nearby farms. Be nice to find one with buildings solid, wells pumping, fences

intact, etc.; be equally nice to meet jolly red-dressed, white-bearded gentleman cruising down road in sleigh pulled by reindeer.

Hi, again. Surprised to see me? Me too. Thinking of changing name to Pauline, serializing journal. Or maybe just stay home, take up needlepoint. Seems during entombment character of neighborhood changed; deteriorated, gotten rough—literally gone to dogs. Stepped out of A & P right into—nope, this won't do. Better stick to chronology; otherwise sure to miss something. Might even be important someday. So:

Awoke fully recovered—again (truly growing tired of yo-yo psychology). Since planned to be out full day, collected small pile of equipment, provisions: canteen, jerky, dried apricots, bag of parrot mix; hammer, pry bar (in case forcible investigation indicated). Went upstairs, outside.

Retained breakfast by force of will until accustomed to aroma.

Took bike from garage, rode downtown (first ride in three months; almost deafened by twin's manic approval). After three months' neglect, tires a tad soft (ten-speed requires 85 pounds); stopped at Olly's Standard, reinflated. And marveled: Utilities still on, compressor, pumps, etc., still working—even bell still rang when rode across hose.

Started to go on way; stopped—had thought. Returned, bled air tanks as had seen Big Olly do. Had explained: Compression, expansion of air in tanks "made water" through condensation; accumulation bad for equipment. Found was starting to think in terms of preserving everything potentially useful

against future need. (Hope doesn't develop into full-blown neurosis; maintaining whole world could cramp schedule.)

Set about conducting check of above-ground resources: Eyeball-inventoried grocery stores, hardware, seed dealers; took ride down to rail depot, grain elevators. Found supplies up everywhere; highly satisfactory results. Apparently business conducted as usual after flash until first symptoms emerged. No evidence of looting; probably all too sick to bother.

And since power still on, freezers in meat markets maintaining temperature; quantity available probably triple that in shelter. If conditions similar in nearby towns, undoubtedly have lifetime supply of everything—or until current stops. (Personally, am somewhat surprised still working; summer thunderstorms habitually drop lines, blow transformers twice, three times a year—and *winter* . . . ! One good ice storm brings out candles for days; prime reason why even new houses, designed with latest heating systems, all have old-fashioned Franklin-type oil stoves in major rooms, usually multiple fireplaces. Doubt will have electricity by spring.)

OH HELL! Beg pardon; unladylike outburst—but just realized: Bet every single farm well in state *electrically* operated. I got *troubles* . . . !

Well, just one more problem for sub-conscious to worry about. Can't do anything about it now—but must devote serious thought.

Back to chronology: Emerged from A & P around ten; kicked up stand, prepared to swing leg over bike. Suddenly Terry squawked, gripped shoul-

der so hard felt like claws met in middle. Dropped bike, spun.

Six dogs: Big, lean, hungry; visibly exempt from "Best Friend" category.

Given no time to consider strategy; moment discovered, pack abandoned stealth, charged. Had barely time to toss twin into air, general direction of store roof, wish Godspeed. Then became very busy.

Had not fought in three months but continued *kata*; was in good shape. Fortunate.

First two (Shepherd, Malamute) left ground in formation, Doberman close behind. Met Malamute (bigger of two) in air with clockwise spin-kick to lower mandible attachment. Felt bones crunch, saw without watching as big dog windmilled past, knocking Shepherd sprawling. Took firm stance, drove forward front-fist blow under Doberman's jaw, impacting high on chest, left of center. Fist buried to wrist; felt scapula, clavicle, possibly also humerus crumble; attacker bounced five feet backwards, landed in tangle. Spun, side-kicked Shepherd behind ear as scrambled to rise; felt vertebrae give. Took fast step, broke Malamute's neck with edge-hand chop. Spun again, jumped for Doberman; broke neck before could rise.

Glanced up, body coiling for further combinations—relaxed; remaining three had revised schedule; were halfway across parking lot.

Looked wildly about for Terry; spotted twin just putting on brakes for touchdown on shopping cart handle 20 feet away. Wondered what had been doing in interim; seemed could have flown home, had dinner, returned to watch outcome.

Retrieved; lectured about stupidity, not following orders—suppose had been flankers? Would have been lunch before I got there.

Birdbrain accepted rebuke; nuzzled cheek in agreement, murmured, "You're so icky-poo!"

Gave up; continued sortie.

Wondered briefly at own calmness. First blows ever struck in earnest; half-way expected emotional side-effects. But none; only mild regret had not met attackers under favorable circumstances. Doberman in particular was beautiful specimen, if could disregard gauntness.

Decided, in view of events, might be best if continued explorations in less vulnerable mode. Decided was time I soloed. Had driven cars before, of course; country kids all learn vehicular operation basics soonest moment eyes (augmented by cushions) clear dashboard, feet reach pedals.

Question of which car to appropriate gave pause. Have no particular hang-ups: familiar (for nondriver) with automatics, three-, four-speed manuals, etc. But would be poking nose down vestigial country roads, venturing up driveways more accustomed (suitable) to passage of tractor, horses; squeezing in, out of tight places; doubtless trying hard to get very stuck. Granted, had been relatively dry recently; ground firm most places, but—considering potential operating conditions, physical demands . . .

Would take Daddy's old VW. Happy selection: Answered physical criteria (maneuverable, good traction, reliable, etc.); besides, had already driven—for sure could reach pedals, see out. Did

give thought to Emerson's Jeep, but never had opportunity to check out under controlled conditions. Further, has plethora of shift levers (three!). True, might be more capable vehicle, but sober reflection suggested unfamiliar advantages might prove trap; seemed simpler, more familiar toy offered better odds of getting back.

Pedaled home quickly, keeping weather eye out for predators (can take hint). Arrived without incident. Found key, established blithe sibling on passenger's seatback; adjusted own seat for four-foot-ten-inch stature, turned key.

Results would have warmed ad-writer's heart: After standing idle three months, Beetle cranked industriously about two seconds; started.

Gauge showed better than three-quarters full, but wanted to make sure: lonely country road frequented by hungry dog packs wrong place to discover faulty gauge. So backed gingerly down drive (killed only twice), navigated cautiously to Olly's. Stuck in hose, got two gallons in before spit back. Beetle's expression seemed to say, " . . . told you so," as capped tank, hung up hose.

Went about tracking down suitable farm in workmanlike fashion, for beginner. Picked up area USGS Section Map from Sheriff's office. Methodically plotted progress as went; avoided circling, repetition. Drove 150 miles; visited 30, 35 farms; marked off on map as left, graded on one-to-ten basis. Were many nice places; some could make do in pinch. But none rated above seven; nothing rang bell until almost dark.

Found self at terminus of cowpath road. Had wound through patchy woods,

hills; felt must go somewhere so persevered to end, where found mailbox, driveway. Turned in; shortly encountered closed gate. Opened, drove through; resecured. Followed drive through woods, over small rise, out into clearing, farmyard. Stopped abruptly.

Knew at once was *home* . . .

To right stood pretty, almost new, red-brick house; to left, brand-new, modern steel barn, hen house; two silos (one new), three corn cribs—all full.

Got out, walked slowly around house, mouth open, heart pounding. No broken windows, doors closed, shingles all in place—*grass cut!* For glorious moment heart stopped altogether; thought had stumbled on nest of survivors. Then rounded corner, bumped into grounds-keepers—sheep.

Owners quite dead. Found remains of man in chair on porch. Apparently spent last conscious moments reflecting upon happy memories. Picture album in lap suggested four impromptu graves short distance from house were wife, three children; markers confirmed. Fine looking people; faces showed confidence, contentment, love; condition of farm corroborated, evidenced care, pride.

Grew misty-eyed looking through album. Resolved to operate farm in manner founders would approve. Had handed me virtual “turn-key” homestead; immeasurably advanced schedule, boosted odds for self-sufficiency, survival. Least I could do in return.

Farm nestles snugly in valley amidst gently rolling, wooded countryside. Clean, cold, fast-running brook meanders generally through middle, passes within hundred yards of house; and by clever fence placement, zigs, zags, or

loops through all pastures. Perimeter fence intact; strong, heavy-gauge, small-mesh fabric. Probably not entirely dog-proof, but highly resistant; with slight additional work should be adequate.

Contents of silos, cribs, loft product of season’s first planting; second crop still in fields—primary reason stock alive, healthy. Internal gates open throughout; allowed access to water, varied grazing (including nibbling minor leakages from cribs, silos). Beasties spent summer literally eating “fat of land”; look it.

Besides five sheep are nine cows (two calves, one a *bull*), two mares, one gelding, sundry poultry (rooster, two dozen chickens, motley half dozen ducks, geese). No pigs, but no tears; don’t like pigs, not wild about pork either.

From evidence, losses over summer low: Found only two carcasses: two cows, one horse. Bones not scattered, doubt caused by dogs; more likely disease, injury, stupidity—salient characteristic of domestic ruminants: Given opportunity, will gorge on no-no, pay dearly later.

Wandered grounds, poked through buildings until light gone. Found good news everywhere looked. Nothing I can’t use as is, put right with minor work.

Clocked distance on return: 17 miles by road. Not too bad; can walk if necessary—should breakdown occur while commuting—but perhaps wiser to hang bike on bumper. Still, machines can’t last forever; only matter of time before forced back to horseback technology. Will still have occasion to visit shelter often. Map shows straightline distance

only nine miles; guess better learn bulldozer operation, add road-building to skills. (Goodness—future promises such varied experiences; may vary me to death . . .)

Was late when finally got back to shelter, tired but glowing all over at prospect. Can hardly wait for morning, start packing, moving in; start of new life.

Demented twin shares view; hardly shut up whole time were at farm. Or since. Lectured stock, dictated to poultry, narrated inspection tour throughout. Hardly took time out for snack, drink. Must be country boy at heart. So urbane, never suspected.

Hey—am really *tired*!

Good night.

Oh! Hurt places didn't even know I had. Suspect must have come into being just for occasion.

Six trips to farm. Count 'em.

Light failed just before self. Packing stuff from house no problem: Eight, ten trips to car; all done. Stuff in shelter is rub. Aye.

Two hundred feet straight up, arms loaded. Repeatedly.

Must be better way.

Good night.

This is embarrassing; guess is time quit posing as genius. Proof in pudding. What matter 200-plus IQ if actions compatible with mobile vegetable?

Occurred this morning to ponder (after third trip up strairs) how excavated material removed during construction. Hand-carried in buckets? Counting stairwell, material involved amounts to 200,000 cubic feet plus. At

half cube per bucket, assuming husky lad carrying doubles. 15 minute round trips, that's 32 cubic feet every eight hours. Would take ten-man crew 625 days—not counting down time due to heart attacks, hernias, fallen arches . . .

And what about heavy stuff? Doubt nuclear generator carried down by hand—must weigh couple tons.

Okay. Obviously done some other way. But how? Oh—shelter manual; had forgotten. Thumbed through quickly, found answer; *elevator*! Of course. Missed significance of small, odd-shaped, empty storeroom during first inspection. Other things on mind; didn't notice controls.

Balance of day much easier. Still tired tonight but not basket case.

Tomorrow is another day . . . !

STOP THE PRESSES! Strike the front page! Scoop! I'm not me—I'm something else. No—we're not us—no—oh, bother; not making *any* sense. But can't help it: hard to organize thought—so DAMNED excited . . . ! Will try, *must* try. Otherwise will end up leaving out best parts, most important stuff. Then, by time get feathers settled, blood pressure reduced, will have forgotten *everything*! *Oh*, must stop this *blithering*! Must get back to chronology. So . . .

Deep breath . . . release slow-oo-owly . . . heart slowed to normal. physical tranquility . . . serenity . . . ohm-m . . .

Amazing, worked again.

Okay, resumed packing this morning. Took two loads over, returned for third. Finished; everything in car, at farm that felt would need. But still fidgeting; couldn't decide why. No question

of something forgotten; farm only short drive away, omission not crisis.

Finally recognized source of unscratchable itch: Was time I did duty. Had avoided at first; knew couldn't face prospect. Then got so busy, slipped mind. But now remembered: Soo Kim McDivott. Teacher. Friend.

To friend falls duty of seeing to final resting place.

Generally inured now to face of death *per se*: unaffected last few days by myriad corpses have stepped over during course of running errands. Had no problem, for instance, removing Mr. Haralsen from porch to proper place beside wife, children; even finished job with warm feeling inside. (Suspect original trauma caused by sudden shock of events; enormity, completeness of isolation.) Condition improved now; felt could perform final service for old friend—more, felt need to.

Went next door, looked for body. Checked entire house: upstairs, downstairs, basement—even stuck head in attic.

Finally returned to library. Teacher had used as study; desk located there, most of favorite dog-eared references close at hand. Hoped might find clue regarding whereabouts amidst clutter.

First thing to catch was "Tarzan File" standing on desk. Large envelope taped to top, printing on face. Glanced at wording. Blood froze.

Was addressed to me!

Pulled loose, opened with suddenly shaking fingers. Teacher's meticulous script, legible, beautiful as Jefferson's on Declaration, read:

Dearest Candidia,

It is the considered opinion of

several learned men familiar with your situation, among them Dr. Foster and myself, that you will survive the plague to find and read this. The viral complex employed by the enemy cannot harm you, we know: it was created as a specific against Homo sapiens.

Almost dropped letter. Surely required no genius to note implications. Took deep breath, read on:

I know, my child, that that statement must sound like the ramblings of an old man in extremis . . .

Ramble? Teacher? Ha! True, was old; condition intrinsic to amount of water over dam—of which lots (all deep, too). Probably also in extremis; lot of that going around when wrote this. But ramble? Teacher? Comes the day Teacher rambles, Old Nick announces cooling trend, New Deal, takes up post as skiing instructor on glorious powder slopes of Alternate Destination. / ramble: Teacher's every word precise, correct.

Precise, correct letter went on:

. . . but please, before forming an opinion, humor me to the extent of reading the balance of this letter and reviewing the supporting evidence which documents 25 years of painstaking investigation by me and other.

Note that of 1,284 incidents wherein wild animals of varying descriptions "adopted" human children, none (with the exception of the very youngest—those recovered from the wild below age three) developed signifi-

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cantly beyond the adoptive parents. They could not be taught to communicate; they evinced no abstract reasoning; they could not be educated. IQ testing, where applicable, produced results indistinguishable from similar tests performed on random members of the "parents" species. Further, except for the 29 cases where the adoptive parents were of a species possessing rudimentary hands (apes, monkeys, the two racoon incidents; to a lesser degree the badger and the wolverine), the children possessed no awareness of the concept of grasping, nor did it prove possible to teach them any manual skills whatever.

Finally, most authorities (note the citations in the file) are agreed that Man is born devoid of instincts, save (a point still in contention) suckling; therefore, unlike lesser animals, human development is entirely dependent upon learning and, therefore, environment.

This principle was deeply impressed upon me during the years I spent studying a number of these children; and it occurred to me to wonder what effect this mechanism might have within human society—whether average parents, for instance, upon producing a child possessing markedly superior genetic potential, might raise such a child (whether through ignorance, unconscious resentment or envy, deliberate malice, or some unknown rea-

son) in such a manner as to prevent his development from exceeding their own attainments; and if such efforts took place, to what extent the child would in fact be limited.

Then followed narrative of early stages of investigation, solo at first, but producing preliminary findings so startling that shortly was directing efforts of brilliant group of associates (including Daddy!), whole project funded by bottomless government grant. Object of search: reliable clues, indicators upon which testing program could be based enabling identification of gifted children (potential geniuses) shortly after birth, before retardation (if such truly existed) began operation.

Efforts rewarded: Various factors pinpointed which, encountered as group, were intrinsic to genetically superior children. Whereupon study shifted to second phase. As fast as "positives" found, identified, were assigned to study group. Were four:

AA (positive/advantaged), potentially gifted kids whose parents were in on experiment; guided, subsidized, assisted every way possible to provide optimum environment for learning, development. AB (positive/nonadvantaged), potential geniuses whose parents weren't let in on secret; would have to bloom or wither, depending on qualities of vine. BA (negative/advantaged), ordinary babies, random selection, whose parents were encouraged (for which read "conned") to think offspring were geniuses; also received benefit of AA-type parental coaching (and coaches didn't know whether were dealing with AA or BA parents), financial

assistance. And BB (negative/nonadvantaged), control group: ordinary babies raised ordinary way. Whatever that is.

As expected, AAs did well in school; average progress tripled national norm. Further, personality development also remarkable: AA kids almost offensively well-adjusted; happy, well-integrated personalities. BAs did well, too, but beat national figures by only 15 percent. Were also generally happy, but isolated individuals demonstrated symptoms suggesting insecurity; perhaps being pushed close to, even beyond capabilities.

ABs also produced spotty results: Goods very good, equaling AA figures in certain cases; however, bads very bad; ABs had highest proportion of academic failures, behavioral problems, perceptibly madadjusted personalities.

BBs, of course, showed no variation at all from national curves; were just kids.

Study progressed cozily; all content as confirming evidence of own cleverness emerged from statistical analysis, continued to accumulate (Teacher, in particular, basking in glow emanating from vindication of theory), when suddenly Joker popped from deck;

It became obvious that AA and AB children lost vastly less time from school through illness. Further breakdown, however, showed that approximately one third of the positives had never lost any time, while the balance had attendance records indistinguishable from the norm. Detailed personal inquiry revealed that these particular children had never

been sick from any cause, while the balance had had the usual random selection of childhood illnesses. It was also determined that these unfailingly healthy positives were far and away the highest group of achievers in the AA group and constituted the best, worst, and most maladjusted of the AB group.

At that time study blessed by convenient tragedy: healthy child died in traffic accident. Body secured for autopsy.

Every organ was examined minutely, every tissue sample was scrutinized microscopically and chemically, and chromosome examination was performed. Every test known to the science of pathology was performed, most three, four, and five times, because no one was willing to believe the results.

And thereafter, quickly and by various subterfuges, complete physicals, including x-rays, and biopsy samples of blood, bone, skin, hair, and a number of organs were obtained from the full test group and compared.

The differences between "healthy" positives and the balance proved uniform throughout the sample, and were unmistakable to an anthropologist . . .

Shock upon shock: Folksy, humble, simple Teacher was Ph.D.—three times over! Was physician (double-barreled—pediatrician, psychiatrist) plus anthropologist. Predictably, renowned in all three—qualities leading to Tenth Degree not confined to Art.

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... but none of themselves were of a character to attract the notice of a physician not specifically and methodically hunting for an unknown "common denominator," using mass sampling techniques and a very open mind; nor would they attract notice by affecting the outcome of any known medical test or procedure. The single most dramatic difference is the undisputed fact, still unexplained, that "healthy" positives are totally immune to the full spectrum of human disease.

Differences proved independent of race, sex: Makeup of AA, AB "healthy" kids 52 percent female; half Caucasoid, one third Negroid, balance apportioned between Oriental, Hispanic, Indian, other unidentifiable fractions. Break-down matched precisely population area from which emerged.

The conclusion is indisputable: Although clearly of the genus Homo, AA and AB "healthy" children are not human beings: they are a species distinct unto themselves.

Quite aside from the obvious aspect of immunity and the less obvious anatomical characteristics which identify them, these children possess clear physical superiority over Homo sapiens children of like size and weight. They are stronger, faster, more resistant to trauma, and demonstrate markedly quicker reflexive responses. Visual, aural, and olfactory functions operate over a broader range and at higher

levels of sensitivity than in humans. We have no data upon which to base even a guess as to the magnitude, but all evidence points toward a substantially longer lifespan.

A study was begun immediately, a search for clues which might help to explain this phenomenon of uniformly mutated children being born to otherwise normal, healthy human couples. And these couples were normal: To the limits of our clinical capabilities to determine, they were indistinguishable from any other Homo sapiens.

However, it was only very recently, after years of the most exhaustive background investigation and analysis, that a possible link was noticed. It was an obvious connection, but so removed in time that we almost missed its significance, due to the usual scientific tendency to probe for the abstruse while ignoring the commonplace.

The grandmothers of these children were all of a similar age, born within a two-year span: All were conceived during the rampage of the great influenza pandemic of 1918-19.

This "coincidence" fairly shouts its implications: Sweeping genetic recombination, due to specific viral invasion, affecting either of the gametes before, or both during, formation of the zygotes which became the grandmothers, creating in each half of the matrix which fitted together

two generations later to become the AA and AB "healthy" children.

Personally I have no doubt that this is the explanation; however, so recently has this information come to light, that we have not had time to study the question in detail. And suspecting that something may be true—even a profound inner conviction—is not the same as proving it. I hope you will one day have the opportunity to add this question to your own studies. It needs answering.

After much reflection we named this new species *Homo post hominem*, meaning 'Man Who Follows Man,' for it would appear that this mutation is evolutionary in character; and that, given time and assuming it breeds true (there is no reason to suspect otherwise—in fact, chromosome examination suggests that the mutation is dominant; i.e., a *sapiens/hominem* pairing should unfailingly produce a *hominem*) it will entirely supplant *Homo sapiens*.

Wonderful thing, the human nervous system; accustoms quickly to mortal shocks. Didn't even twitch as other shoe landed—or perhaps had anticipated from buildup; just wondering how would be worded:

Very nice; no fanfare, just matter-of-fact statement:

You, my child are a Homo post hominem. You are considerably younger than your fellows among the study group, and were never

involved in the study itself. Your identification and inclusion in our sample came about late and through rather involved and amusing circumstances.

The Fosters, as you know, had long desired a child and had known equally long that they could never have one. When your natural parents died, it was entirely predictable that they lost no time securing your adoption (which is certainly understandable; you were a most winning baby).

Neither Daddy nor rest of staff thought to have me tested; had been exposed to ten months' "unmonitored parentage"; was "compromised subject." Besides, Daddy wasn't interested in studying me; wanted to enjoy raising "his little girl." Professional competence crumbled before gush of atavistic paternalism. Most reprehensible.

Momma disagreed; felt determination of potential would provide useful child-rearing information. In keeping with formula long established for maintaining smooth marriage, kept disagreement to self; however, took steps: Prevailed upon staff to test me—all unbeknownst Daddy.

Tests proved positive, but follow-up determination as to "healthy" status not performed—didn't occur to discipline-blinded scientists, and Momma didn't know any better so didn't insist.

You were a genius; she was content. And she thereupon took it upon herself to see that you were raised in the same "advanced" manner as the rest of the AAs—with the exception of the

Analogue Science Fiction/Science Fact

fact that the doctor did not know this was taking place. He continued to enjoy his "daddy's little girl" as before, prating endlessly about the advantages of "sugar and spice," etc. And as for the rest of us, after swearing each other to secrecy about your test results and our involvement, we forgot you. You were, after all, a "compromised subject."

Was almost five when next came to their attention. Had soured "sugar and spice" by glancing up, commenting living room wall " . . . looks awful hot." Was, too—result of electrical fault. Would have burned down house shortly.

Remember incident clearly. Not that caused any particular, immediate fuss, but Daddy spent balance of evening trying not to show was staring at me.

The doctor had spent much time during the previous few years observing children whose visual preception extended into the infrared and ultraviolet; and as shortly thereafter as possible, without letting Mrs. Foster know, he had you examined and tested.

Oho! Finally—explanation what triggered Daddy's reaction that day—and of friends' inexplicable night-blindness, even during summer. Of course, could understand difficulty seeing at night during winter; is dark outside on cold night. Only perceptible glow comes from faces, hands; and after short exposure to cold, cheeks, noses dim perceptibly.

And remember also that testing session. Salient feature was expressions of other staff as repeated tests done on previous (conspicuously unmentioned)

Emergence

occasion: utterly deadpan.

It was only after the tests (performed fully this time) identified you as a Homo post hominem; after the doctor had diffidently broached this fact to Mrs. Foster and she, giggling helplessly, confessed to him and, finally, we also came clean, that further testing demonstrated that you were substantially more advanced in intellectual development than the profile developed by our studies suggested you should be at that age.

How nice. Even as superkid can't be normal; still genius. Is no justice.

Detailed analysis of this phenomenon brought forth two un-assessable factors: One, you had experienced ten months of un-monitored BB parentage; and two, your subsequent upbringing had been AA from your mother but BB from your father. Since we could neither analyze nor affect the first of these, we chose to continue the second factor unaltered, observing you closely and hoping that in some way, then unknown, the whipsaw combination of indulgent spoiling and accelerated, motivational education you had received to this point would continue to produce these outstanding results.

Momma's death terminated experiment; but before she left, made Teacher promise would take over overt management of education, keep pushing me hard as would accept while Daddy (apparently) continued classic BB father

role. Momma felt hunger for knowledge already implanted; abetted by Daddy's careful negative psychology, seeding of environment with selected books (*Ha!* Always suspected something fishy about circumstances surrounding steady discovery of wanted, needed study materials, always just in time, just as finishing previous volume—not complaining; just wish planting had gone faster), would carry on through interim without lost momentum. Was right, too—but now know how puppet must feel when wires too thin to discern.

Phase Two of scheme hit snag, though: was not anticipated would take four years for Teacher to extricate self from complications attendant profession(s), “retire.”

Fortunately the delay appeared to be without consequences. Mrs. Foster's opinion of you was borne out; Dr. Foster reported that you located every book he planted—and not a few that he didn't. He said it was rarely necessary to “steer” you: that you were quite self-motivated, distinctly tenacious, and could be quite devious when it came to tracking down knowledge in spite of the “barriers” he placed in your way.

By the time I managed to delegate all my other responsibilities to my successors and devote my entire attention to you your advantage over other AAs had increased impressively. There were only a very few individuals showing anywhere near as much promise. And by the time the blunderings of our late friends

behind the Iron Curtain put an end to all such research, you were—for your age—quite the most advanced of our hominems.

If I seem to harp on that point, it is because you must remember that this study was initiated some 20 years ago. You are ten years younger than the next youngest in our group; and as advanced as you are for your age, you still have considerable catching up to do—see that you keep at it.

Yes, I know; the exigencies of solo survival will occupy much of your time, but do not neglect your studies entirely. Cut back if you must, but do not terminate them.

Now, if I may presume to advise a singularly gifted member of an advanced species, there is security and comfort in numbers. You will doubtless find the preservation and extension of knowledge more convenient once a group of you have been assembled. Within the body of the Tarzan File you will find a complete listing of known Homo post hominems. I can anticipate no logical reason why most should not be alive and in good health.

Pawed through file with shaking hands. Found listing referred to: collection of mini-dossiers. One had small note attached. Read:

Dear Candy,

It is now almost time for me to leave, and a number of things still remain undone, so I must be brief.

The subject of this dossier,

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Peter Bell, is the direct, almost line-bred descendant of Alexander Graham Bell (would that I could have tested him). A measure of his intellect is the fact that he, alone of our hominems, deduced the existence and purpose of our study, the implications regarding himself, and most of the characteristics of his and your species.

To him, not long ago, I confided your existence, as well as my impressions of your potential.

As well as probably being your equal (after you reach maturity, of course), he is also nearest to your own age, at 21; and of all our subjects, I predict he is the most likely to prove compatible with you as you continue your unrelenting search for knowledge in the future—in fact, he may give you quite a run for it; he is a most motivated young man.

However, I was unable to reach him following the attack; therefore he does not know that you are alive and well in the shelter. The burden is upon you to establish contact, if such is possible—and I do urge you to make the attempt; I feel that a partnership consisting of you two would be most difficult to oppose, whatever the future may bring you.

*Love,
Teacher*

Hands shook, blood pounded in head as turned back to first letter. Balance consisted of advice on contacting other hominems—AAs from study.

Cautioned that, based on (terribly loose) extrapolation of known data, should be perhaps 150,000 of us on North American continent—but virtually *all* must be considered ABs, replete with implications: High proportion of maladjusteds, discontents, rebels, borderline (or worse after shock of depopulation) psychotics, plus occasional genius. Plus rare occurrences of surviving Homo sapiens.

Teacher suggested moving very deliberately when meeting strangers: Evaluate carefully, rapidly, selfishly. If decide is not sort would like for neighbor, hit first; kill without hesitation, warning. No place in consideration for racial altruism. Elimination of occasional bad apple won't affect overall chances for lifting species from endangered list; are enough of us to fill ranks after culling stock—but only one *me*. Point well taken.

Well, time grows short. So much remains to be accomplished before I leave, so I had best hurry.

I leave with confidence; I know the future of the race is in hands such as yours and Peter's. You will prosper and attain levels of development I cannot even envision; of that I am certain. I hope those heights will include much joy and contentment.

I might add this in parting: When your historians tell future generations about us, I hope they will not be unduly severe. True, we did not last the distance; also true, we did exterminate ourselves, apparently in a display of senseless, uncontrolled aggression; equally true, we did many

other things that were utterly wrong.

But we did create a mighty civilization; we did accumulate a fund of knowledge vast beyond our capacity to absorb or control; we did conceive and aspire to a morality unique in history, which placed the welfare of others ahead of our own self-interest—even if most of us didn't practice it.

And we did produce you!

It may well be that we were not intended to last more than this distance. It may even be that your coming triggered seeds of self-destruction already implanted in us for that purpose; that our passing is as necessary to your emergence as a species as was our existence to your genesis.

But whatever the mechanism or its purpose, I think that when all are judged at the end of Time, *Homo sapiens* will be adjudged, if not actually a triumph, then at least a success, according to the standards imposed by the conditions we faced and the purposes for which we were created; just as the *Cro-Magnon*, *Neanderthal*, and *Pithecanthropus*—and even the *brontosaur*—were successful in their time when judged in light of the challenges they overcame and the purposes they served.

Single page remained. Hesitated; was final link with living past. Once read, experienced, would become just another memory. Sighed, forced eyes to focus:

Candy, my beloved daughter-in-spirit, this is most difficult to bring to a close. Irrationally I find myself grieving over losing you: "irrationally," I say, because it is obvious I who must leave. But leave I must, and there is no denying and little delaying of it.

It will be well with you and yours. Your growth has been sound, your direction right and healthy; you cannot fail to live a life that must make us, who discovered and attempted to guide you this far, proud of our small part in your destiny, even though we are not to be permitted to observe its fulfillment. I think I understand something of how Moses must have felt as he stood looking down that last day on Nebo.

Always know that I, the doctor, and Mrs. Foster could not have loved you more had you sprung from our own flesh. Remember us fondly, but see that you waste no time grieving after us.

The future is yours, my child; go mold it as you see the need.

Goodbye, my best and best-loved pupil.

Love forever.

Soo Kim McDivott

P.S.: By the authority vested in me as the senior surviving official of the United States Karate Association, I herewith promote you to Sixth Degree. You are more than qualified; see to it that you practice faithfully and remain so.

Read, reread final page until tears deteriorated vision, made individual word resolution impossible. Placed letter reverently on desk, went upstairs, outside onto balcony porch. Was Teacher's favorite meditation setting. Settled onto veranda swing, eased legs into lotus.

Terry understood: moved silently from shoulder to lap, pressed close, started random-numbers recitation of vocabulary in barely audible, tiny baby-girl voice. Held twin nestled in arms as pain escalated, tears progressed to silent, painful, wracking sobs. Sibling's uncritical companionship, unquestioning love all that stood between me and all-engulfing blackness, fresh awareness of extent of losses threatening to overwhelm soul.

Together we watched early-afternoon cumulonimbus form up, mount into towering thunderheads, roil and churn, finally develop lightning flickers in gloom at bases, arch dark shafts of rain downward to western horizon; watched until fading light brought realization how long had sat there. Brighter stars already visible in east.

Reviewed condition with mounting surprise: Eyes dry, pain gone from throat, heart; blackness hovering over soul mere memory. Apparently had transcendentalized without conscious intent, resolved residual grief. All that remained was sweet sadness when contemplated Daddy, Momma, Teacher; were gone along with everything, everybody else, leaving only memories. Suddenly realized was grateful being permitted to keep those.

Cautiously moved exploratory muscle, first in hours. Terry twitched, fret-

ted; then woke, set up justifiable protest over starved condition. Arose, shifted twin to shoulder; went inside, downstairs.

Picked up Tarzan File, Teacher's letter, went back to Daddy's house. Fed birdbrain, self; settled down, skimmed file's contents.

Presently concluded Teacher correct (profound shock, that): Peter Bell doubtless best prospective soulmate of lot. Very smart, very interested, very conscious: educational credits to date sound like spoof (*nobody* that young could have learned that much, except, uh . . . perhaps me—okay); very strong, quick, very advanced in study of Art (Eighth Degree!); plus (in words of Teacher): "Delightfully unconcerned about his own accomplishments; interested primarily in what he will do *next*." And, ". . . possessed of a wry sense of humor." Sounds like my kind of guy. Hope turns out can stand him.

Sat for long moments working up nerve. Then picked up phone, deliberately dialed area code, number. Got stranded after a few moments' clicking, hissing when relay somewhere Out There stuck. Tried again: hit busy circuit (distinct from busy number: difference audible—also caused by sticky relay). Tried again muttering in beard. Stranded again. Tried again. Failed again.

"That's *bad*," offered Terry enthusiastically, bobbing head cheerfully.

Took deep breath, said very bad word, tried again.

Got ring tone! Once, twice, three times; then: Click. "Hello, is that you, Candy? Sure took you long enough. This is Peter Bell. I can't come to the

phone right now: I'm outside taking care of the stock. But I've set up this telephone answering machine to guard my back. It's got an alarm on it that'll let me know you've called so I can check the tape.

"When you hear the tone at the end of my message, give me your phone number if you're not at home—*don't forget the area code* if it's different from your home—and I'll call you back the moment I get back and find your message. Boy, am I glad you're all right.

"Beep!"

Caught agape by recording. Barely managed regroupment in time to stutter out would be home; add if not, would be at farm, give number before machine hung up, dial tone resumed.

Repeated bad word. Added frills tailored specifically for answering machine.

Did dishes, put away. Refilled twin's food dish, changed water; moved stand into study, placed next to desk, within convenient head-scratching range.

Settled into Daddy's big chair, opened journal, brought record up to date. Have done so. Now up to date. Current. Completely. Nothing further to enter. So haven't entered anything else. For quite a while.

Midnight. Might as well read book. Stupid phone.

Awoke to would-be rooster's salute to dawn's early light. Found self standing unsteadily in middle of study, blinking sleep from eyes, listening to echoes die away. Glared at twin; received smug snicker in return.

Took several moments to establish location, circumstances leading to night

spent in chair with clothes on. When succeeded, opened mouth, then didn't bother—realized bad word wouldn't help; no longer offered relief adequate to situation.

Casual approach had worn out about one a.m.—by which time had read possibly ten pages (of which couldn't remember single word). Featherhead snored on stand; nothing within reach to disassemble, had lost interest.

Yawning prodigiously myself by time abandoned pretense, grabbed phone, dialed number.

Got through first try. But was *busy!*

Repeated attempt at five-minute intervals for two hours or until fell asleep—whichever came first.

Have just tried line again. Still busy. Better go make breakfast.

Contact problem no longer funny. In two months since last entry have averaged five tries daily. Result: Either (usually) busy signal or transistorized moron spouts same message. One possible explanation (among many): Recorded message mentions no dates; could have been recorded day after Armageddon, yesterday—anytime.

Not that am languishing, sitting wringing hands by phone, however; have been *busy*. Completed move to farm; padded supply reserves; shored weaknesses; collected additional livestock, poultry. Have electrified fences, augmented where appeared marginally dogproof; trucked in additional grain (learned to drive semi, re-re-re-replete with 16-speed transmission—truly sorry about grain company's gatepost, but was in way; should have been moved long ago); located, trucked in two au-

tomatic diesel generators, connected through clever relay system so first comes on line (self-starting) if power fails, second kicks in if first quits. So far has worked every time tested, just as book said.

Have accumulated adequate fuel for operation: Brought in four tankers brim full of diesel (6,000 gallons each); rigged up interconnecting hose system guaranteeing gravity feed to generators—which ever needs, gets. At eight gallons hourly (maximum load) should provide over four months' operation if needed. (However, farm rapidly taking on aspect of truck lot. Must think about disposing of empties soon; otherwise won't be able to walk through yard.)

Overkill preparations not result of paranoia. Attempting to make place secure in absence; improve odds of finding habitable, viable farm on return, even if sortie takes longer than expected. Which could; is over 900 miles (straight-line) to file's address on Peter Bell. And he's only first on AA list; others are scattered all over.

Have attempted to cover all bets, both home and for self on trip. Chose vehicle with care: Four-wheel-drive Chevy van. Huge snow tires bulge from fenders on all four wheels, provide six inches extra ground clearance, awesome traction. Front bumper mounts electric winch probably capable of hoisting vehicle

bodily up sheer cliff. Interior has bed, potty, sink, stove, sundry cabinets—and exterior boasts dreadful baroque murals on sides.

Though might appear was built specifically to fill own needs (except for murals—and need for build-ups on pedals), was beloved toy of town banker. When not pinching pennies, frittered time away boonies-crawling in endless quest for inaccessible, impassable terrain. Bragged hadn't found any. Hope so; bodes extremely well for own venture.

Personal necessities, effects aboard. Include: Ample food, water for self, Terry; bedding, clothing, toiletries; diverse tools, including axe, bolt cutters, etc.; spares for van; siphon, pump, hose for securing gas; small, very nasty armory, including police chief's sawed-off riot gun, two Magnum revolvers, M-16 with numerous clips and scope. Not expecting trouble, but incline toward theory that probably won't rain if carry umbrella.

Leaving this journal here in shelter for benefit of archeologists: keep separate book on trip. Can consolidate on return, but if plans go awry this account still available for posterity.

Well, time to go; unknown beckons.

But have never felt so small. Awfully big world waiting out there.

For me. ■

● People must understand that science is inherently neither a potential for good nor for evil. It is a potential to be harnessed by man to do his bidding.

GLENN T. SEABORG

Jay Kay Klein's

BIOLOG

● F. Paul Wilson was among the last writers developed by John Campbell, long-time *Analog* editor and founder of modern science fiction. Paul was the author of several years worth of manuscripts returned with long, encouraging letters of comment pointing out what needed improvement. His first sale was held for the August, 1971 issue of *Analog*, while a second sale made a first appearance for the writer in April, 1971. For that issue, Stanley Schmidt had the cover story.

Paul had been determined to get one story, at least, published before he went over the hill at thirty. When he succeeded, he found the money was needed to help him get through the medical school he was attending in Missouri. Now, he likes writing so well that he has opted for a dual career. He practices family medicine with a five-man group near his home in Brick Town, New Jersey, permitting him to be a full-time physician and a full-fledged writer.

All his stories except the one in this issue have been set in the universe of the LaNague Federation, based on his own Libertarian view of existence. In this, individuals and societies would have minimum restraints on any activities, as long as other individuals and societies were not harmed. He fears homogenization of mankind more than nuclear meltdowns and believes that man's future lies off this planet.



F. Paul Wilson

Paul's third story, *Wheels Within Wheels* in the September, 1971 issue, not only received the cover, but in an expanded version went on to win the first annual Prometheus Award, and its very solid prize of 7-1/2 ounces of gold. Since then, his books have appeared not only in the United States, but also in Britain, Spain, Italy, and Mexico. *An Enemy of the State* has recently been published by Doubleday, and a fantasy novel, *The Keep*, is due out shortly.

Aside from two full professions, Paul jogs a mile daily, collects old pulp magazines, plays drums, guitar, and piano, writes music, tends bonsai trees, and is raising two girls.

J.E. Enever

MERCURY'S MISSING DIVOT

**Did a piece of Mercury disappear
into space in a violent collision?**

Fourteen years ago, John Campbell published my "Giant Meteor Impact." The article looked at an impact by four cubic kilometers of asteroid at 50 km. per second. My ideas withstood criticism. Professor Zdenek Kopal of Harvard and Manchester incorporated these ideas into his book, *Man and His Universe*.

I named the asteroid Vredevoort II, after an actual impact in South Africa, and chose my imaginary target with diabolic callousness, for I aimed it into the ocean. Three of every four meteorites strike here, the proportion of water-to-land-surface on our planet. Such falls are more destructive than those on continental targets. Water has high specific heat. It stores the strike's energy—but only to draw out calamity later.

Energy there was, for sure: 4×10^{29} ergs; that of a million H-bombs. I fore-

saw results: First, a 50 km. wide crater in the ocean bed. Penetrating the crust, this exposed the glowing mantle of the planet. That set geothermal heat at large, to back up the impact flash and fireball. The flare reached temperatures in the MK° range, millions of degrees. An enormous fireball squatted on the crater, unable to float away, for it reached into the vacuum of the ionosphere. Dust, haze, and clouds shrouded the world with long term effect on terrestrial weather. The blast worked damage at continental range. Enormous tsunamis scoured coastal lowlands across the world.

I set reasoned figures for the scale of such disasters. Another escaped calculation. The strike was certain to cause earthquakes, but in 1965 I was unable to quantify them. Recently, I came upon a yardstick. This is made of rubber; yet, elastic as it is, it is better than none at

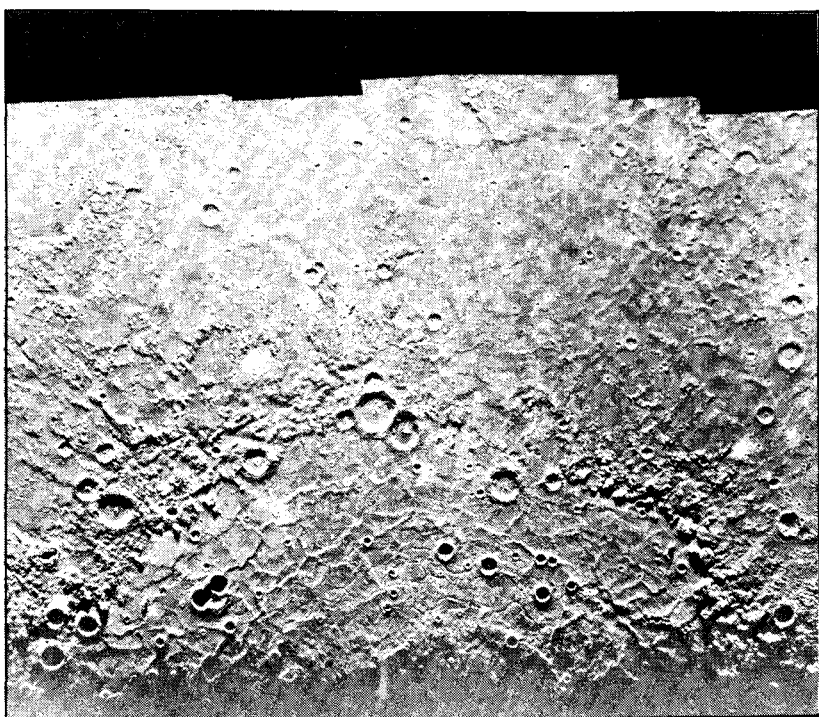
all. I could now foresee the scale of seismic effect.

That rubber yardstick, however, put me onto something far more important. We know of greater impacts around the solar system. Their power is clear from their effects. They convulsed bodies they hit. Close range photos from space witness seismic effects. On our moon, Mare Orientalis is surrounded by three concentric rings of mountain folds. These are *not* crater walls made of ejected debris, nor even nappes of everted strata like those around the pro-

totype Vredevort site; they are full-blooded mountain chains, like the Appalachians, but forged by a single hammer blow.

I found my rubber yardstick at a similar site: the Caloris Basin on Mercury. This is surrounded by a ring-range. That too resulted from a single impact. Caloris, however, is half as wide as Luna. The basin itself is 1,300 km. across—one quarter the diameter of the entire planet. The ring-range is but one of its seismic features. In good time I will come to another and thence to seismic effects of

JET PROPULSION LABORATORY



Mercury's Caloris Basin can be clearly seen in the enhanced set of Mariner 10 photos. The name Caloris (hot) basin was given to the feature because of its position near one of the subsolar points on Mercury at perihelion.

terrestrial impacts. But Caloris covers the combined area of the U.K., France, Spain and the Low Countries. A blow that large deserves notice.

Serious consideration of impact craters began in our lifetime and stems from the pioneer work of two Americans. The first, of course, was the engineer, Berringer, who investigated the Arizona crater. Baldwin, an astronomer, set the work on firm statistical foundations four decades later.

Baldwin illustrated the energy of impacts in a simple way. He plotted lunar craters on the same smooth curve as holes made by other explosions. Great impacts are explosive and effects relate to power. When lunar maria and Caloris Basin are fitted on Baldwin's curve we can estimate the energies which made them. The Caloris Object lobbed out 10^{25} ergs . . . a million times the energy of my artificial asteroid, the power of a million million H-bombs. Note in passing: Our sun converts about four million tons of matter to energy every second. Here, we have power on this solar scale.

Whatever the exact power, the Caloris strike was Heap Big Medicine. This was delivered in an instant, wrapped up in a single packet. How big a packet? Yer pays yer money and yer takes yer choice. The range of possibilities is unbroken, yet is limited at top and bottom. Bounds are set by feasible impact speeds. Here we consider only bodies which belong to the solar system. Dr. Forward and others tell of bodies thronging interstellar space; their speeds have higher limits. Intriguing, but we lack experience of them.

When Earth collides with another solar body the speed may be as low as 20 kps. (Even somewhat lower, but the odds are against this, as they are against top speeds of 50 kps.) Mercury, however, is closer to Sol than Earth. Bodies intruding as deep as the innermost planet suffer a long, strong pull from Sol. Furthermore, they may run head on into the planet. Its high orbital velocity then combines with the object's perihelion peak. Meteor can marry Mercury at 120 kps. On the other hand, the meteor may overtake the planet along its orbit; the speed is then as "low" as 30 kps.

$E = \frac{1}{2} m v^2$; we can work out masses for all cases in that range. A body zipping in at 120 kps will mass as little as 1.4×10^{15} tonnes. Lumbering in at 30 kps, the figure is sixteen times as great— 2.2×10^{16} tonnes. I handle few parcels of this order; I cannot visualise such masses. However, I fool myself that dimensions are more familiar. Sizes depend on the material of the asteroid. The chances are that this is rock, and so $2\frac{3}{4}$ times as dense as water. At the higher speed that presents us with a volume of 5×10^{14} cubic metres, a diameter of 100 kilometers.

We can reduce that to 70 km. for a nickel-iron asteroid, but the odds are it was rock. At a quarter the impact speed, it has sixteen times the mass . . . let me see . . . cube root of sixteen times the diameter. . . . About 250 kilometers across! Or 175 km. for power-packed nickel iron.

Bodies as big are uncommon. The Asteroid Belt itself counts them only in dozens. Like the brontosaurus, they are

in short supply, but high speed *can* be attained. So I am for minimum mass at maximum velocity. We are spared a minor problem. *Any* body in that size range is likely to be a sphere. Shape and impact attitude could affect the results. As is, we have the simplest case.

One marvels that such a cannonball left Mercury in one piece, but match the target with the missile: the planet has 125,000 times the volume. What is more, the impact frittered away energy as heat and radiation. You will see that one effect of these was limited to line-of-sight.

Despite such points, the strike was hair-raising. It made a circular basin, like Mare Imbrium on the moon. (Irregular maria are another kettle of fish.) A second result is the surrounding ring-range. We studied both by proxy, on photos snapped by Mariner Ten. These by themselves do not show a third effect, for this was on the far side of the planet. A fourth result is conspicuous by its absence: the dog that didn't bark in the night. I am tickled to be the first Holmes to observe this negative.

Caloris shares an odd feature with Lunar Maria: it is extremely shallow. For all its breadth of 1,300 km. its center is but 9 km. below the general level of Mercury's surface. At maximum, its depth is less than 1% of its diameter. An explanation advanced is that it was deeper to begin with—I concur—but was filled with magma from below, which I reject. I feel confident that my own explanation is correct. Supplies of magma are doubtful for bodies as small and cold as Mercury and Luna. I will come to my own interpretation.

That shallow profile is deceptive. It applies to a surface as extensive as Western Europe. Take the profile of the basin as triangular; in short, assume an inverted cone is missing. The basin's capacity is then *four million cubic kilometers*! The section might be parabolic, which gives a capacity half as large again. . . . or could be convex from edge to center, giving a smaller volume. The cone seems a reasonable compromise, as base for estimates. I stick to—or am stuck with— 4×10^6 cubic kilometers. In any reasonable rock, that's 10^{16} tonnes—about eight times the mass of the Object.

Smaller missiles shift as much in relation to their size. But look at Plato or Copernicus on the moon—or the target of a common or garden Grand Slam bomb. Stuffing for these cavities is very visible. Lunar craters are walled with debris thrown out by the impact. Holes made by ten-ton bombs are surrounded by scattered spoil. Four million cubic kilometers of ejecta can hardly escape the eye! This could bury the whole planet under 70 meters of loose rubble! Of course, we cannot expect gate-crashing meteors to be that tidy. . . . Since debris is not piled up as a basin wall, perhaps it is scattered around outside the basin. We can hardly miss such a volume.

The fact is staggering. It is nowhere to be seen. Outside the ring-range, Mercury is pitted by craters of all sizes, like the moon. The basin, however, is fairly free from astroblemes. Now the aeon just after the creation of the solar system saw most of its craters formed on the moons and planets. So, Caloris was

made *after* this era: it is *younger* than other Mercurian scenery. That is shown by its relative freedom from cratering. It follows that the volume from that vacancy should have been deposited upon older features. It was not.

I see only one explanation. If missing material isn't upon the planet, it left the planet. Equally staggering, its absence has attracted no previous notice. Perhaps the shallow contours distract us from what is now just vacuum. The hollow isn't labelled with a neon sign. . . . Its terrain differs from others on Mercury mainly in being smoother. Future exploration may show it similar to Neil Armstrong's first footing on the moon. Warmer, of course: noon temperature on Mercury's equator is 700° K.

Here and now I claim to know the steps by which that barren saucer was shaped. An exact model of the physics of the vent will doubtless modify my picture in detail, yet I feel sure that it is broadly accurate.

The Caloris Object weighed 1.4×10^{21} grams; but delivered 10^{16} ergs. Which is 2.4×10^{17} calories. *1¼ million calories for every gram!* We can't put that charge in our pipe and smoke it. At most, heating a gram of rock uses one fifth of one calorie. That gives the measure of the temperature developed by the impact. You can calculate the number of fifths in $1\frac{1}{4}$ million. . . . Temperatures rose toward 9 MK°. . . . There was not only *total power* but power at *high potential*.

The Caloris strike differed from that of smaller bodies—even those as big as my Vredevoort II. Enormous size was

joined by enormous energy. The size prolonged processes; they took more time. Radiation could not escape through 50 kilometers of plasma at the speed of light. The transformation of thermal motion at the center into radiation from the surface was *not* 'immediate.' Indeed, the Object's leading face hit the surface a second before its rear. The van was transformed into compressible plasma. This was indeed compressed by the mass of the rearguard. Compression continued until this also flared with heat and changed to plasma.

Even milliseconds mattered. They made a difference. Mind you—processes were fast!

There was another distinction. The Object worked in vacuum; in general, there were fewer side effects: no evaporation of sea-water; no tsunami; no blast through atmosphere; no supersonic superboom; *no atmosphere to blanket radiation*. Further differences are fairly obvious: more intense heat and radiation, a much more violent seismic tremor. The effects on Mercury's orbit and axial rotation are unknowable. (Rene Gallant in "Bombarded Earth," considered a similar strike. He assigned 15% of the total to axial effects.)

Energy obeys entropy. Never destroyed, it is ever degraded. After degradation, the work it performs is fixed by its surroundings. In the core of a star, the Object would function as an energy sink, not an energy source. Pitched onto Mercury, waste from what it spent on one task could work havoc on others. Here is my scenario for the Great Mercurian Vanishing Act: Now You See It, Now You Don't. A con-

juror's time-scale is near to that of the Asteroid. . . .

The Object struck and flared into plasma. Molecules broke into atoms; atoms lost electrons; even nuclei were disturbed. Knowing the calorie count you can accept that the Flash was in the MK° range—and it deserves the capital letter.

Hot bodies radiate. The fourth power of temperature sets the rate of radiation. We take a bar of iron from the furnace, glowing at 1,200° K. Then we quench it in water to a quarter this temperature, 300° K. Before quenching, it radiated $4 \times 4 \times 4 \times 4$ —256 times—as fast as afterwards.

Let me lead you up a wrong turning point to an answer we must not accept. This still helps us to face what the Object *did* achieve. The surface temperature of the sun is 6,000°K. Divide 9 MK° by this. 9MK° is 1,500 times the temperature of the solar surface. The fourth power of 1,500 is five million million.

That many times the energy from each square inch of Object, than each square inch of Sol. But the sun's surface is only two hundred million times that of the Object! Now we can't have the Object pouring out energy 25,000 times as fast as the entire Sun! Not for the briefest instant. To accept this ignores the matter of delay, the lag coming from the Object's very size. The flare did not peak as a whole. Zones at the rear were still moving when the van had braked and flared. Those 10^{35} ergs of kinetic energy did *not* take other forms *at once*. Yet I am in no doubt that temperatures in the MK range *were* reached—and

held for specific intervals. We must appreciate this: if they attained "only" 1 MK° rather than 9MK°, their higher levels were held for longer periods. Energy had been realized, it must emerge. At the unbelievable level of 9 MK°, a unit area radiates about 6,500 times as fast as a similar surface at a mere 1 MK°. That difference is by no means immaterial. Yet, broadly speaking, we must balance rate of flux against duration.

In either case, radiation is of incredible intensity. In either case, its frequency is very high indeed; we have a flood of penetrating Gammas and hard X-rays.

Temperature and frequencies then tobogganed down that fourth power curve. At first this sloped like a cliff; descent was headlong. Before long, the Object radiated less insanely than at first though still at an awesome rate—as fast, perhaps, as a high-voltage spark. . . . then merely as fast per unit area as S Doradus . . . as 'slowly' as Rigel . . . then as Canopus . . . then at merely the rate of Sol . . . But don't ignore the phenomenon's size. The flare expanded as it cooled. There were more square inches to radiate. Yes, intensity per square inch fell, but total intensity fell more slowly than the temperature. The Object spent a longer time in each successive range of temperature. Electrons rejoined nuclei. Though far less dense than before, the Object was no longer plasma.

A division between Flash and Fireball is arbitrary. The process was continuous. Yet the upshot is clear. The incandescent Object might take several heartbeats to double in size. Even this

gave a rate of expansion well above 5 kps. Well above escape velocity for Mercury.

It was outward bound in all directions, headed for space. Small wonder. The average temperature in a Tokamak chamber is lower than that of the flare. This had already finished another task. It did not make its own law, but obeyed that of inverse squares. Radiance diminished with distance. What is more, half its brilliance was directed outward. Neither fact set the limit to its work. Simply—this was the skyline, the horizon from which its summit could be seen.

The Object bored into Mercury, yet expanded. When radiation was still beyond all Earthly parallel, it stood a hundred kilometers above the surface. From this height, the horizon is the rim of Caloris Basin. *That far out, the landscape fused.*

Melting reached below the surface. Radiation from the Flash and swelling Fireball was *hard*. It penetrated, and penetrating, heated. A *layer* of landscape fused, in depth. Thickest near the center, this tapered out at the edge of the basin. At near hand, the effect went beyond fusion. The Object enlarged its crater as much by vaporizing rock as by blasting it away. Where liquid spoil moved out, much turned to gas as it flew. That which did not, lost its identity; it dropped on the lava field, and merged with this. Gases, however, joined the fireball. The result was a central crater with sloping sides—a shallow funnel. This directed the growth of the lower fireball, and set a course for its expansion.

A flower bloomed in vacuum. Its calyx was vaporized rock rushing out across that fiery funnel. The corolla was the fireball's swelling creation. Soon, gas condensed as micro- and nano-meteorites, cosmic dust. Yet, in aggregate, four million cubic miles of this was lost forever to Mercury. Our space-borne counters register hits from that powder to this day.

The Object's energy could cope with all I describe, with fusing the surface of Caloris Basin; with expelling glowing gases into space; with work inside the planet. These and all wastage are covered by my first statement: 10^{35} ergs was the *order* of the energy.

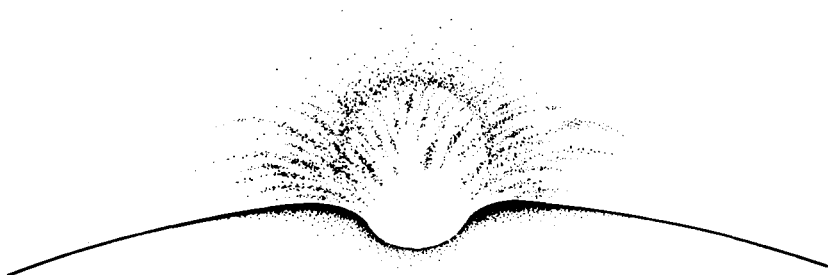
That gave me a little license; I will subject this to slight abuse. Make the energy 5×10^{35} ergs. That is, 1.4×10^{22} kilowatt hours, enough to spin your electric drill for better than a million million million years. . . . Put another way, it is 5×10^{28} watt seconds. But the sun's luminosity is only 4×10^{26} watts!

The impact made a notable addition to the luminosity of the whole solar system. Assume that 80% of the radiation flared out as radiation in one second. For that second, Sol seemed five stellar magnitudes brighter. Mind you, X-ray vision was needed to see it so, and we badly need an exact calculation of the time the radiation stayed near its peak. Modelling this will call for some high grade talent backed by a fast computer. It is enough to say that the brightness of the Object by visible light was at least comparable to that of the entire sun.

Thomases who doubt fusion of the basin surface may see light by this. The effect was more than superficial. There



A. Three seconds before S second. The dash lines give line-of-sight to the horizon of the basin rim from 100 km. above Ground Zero.



B. Flash, flare & fireball. A slight thickening of the surface profile exaggerates the depth of the lava field.

Rick Sternbach



C. Today. We can regard the solid plug of lava as a Mascon.

My diagram shows no depression in the planet's profile; its scale is too small to draw a 9 km. hollow. That shallowness cries out for explanation. The precise contour should differ from any which would result from infilling by magma from below. People with access to data in NASA files please note and investigate! In "B," blast and vaporization are shaping the impact crater into a funnel. "C" gives the final position. The surround drains into the crater and fills the central depression. A plug of lava constitutes a Mascon. Lunar Orbiter detected Mascons in 1968. They were first interpreted as deep-set kernels. The interpretation was revised—more, I suspect to accord with theories than with precise gravimetric data. The theory being this—internal lava diffused through the regolith across the entire Mare. This was seen as giving isostatic compensation for mass ejected by the impact. Where that went is unconsidered or scamped. . . . I doubt provenance of Magma from the interiors of Mercury and the Moon. I doubt that their mantles (if any!) creep, as does the Earth's. I doubt that gravity demands—or can obtain—isostatic compensation in their *thicker* crusts. We see no close investigation of these points. Another must await that exact physical model. I suspect that the scale of the Caloris impact worked to increase the proportion of energy spent on radiation and thus, to decrease the relative size of the crater. Impacts which created Lunar Maria are credited with penetrations of 20 km. (Again—by what calculation?) Mass of Object constant, penetration, P , should run at roughly $P = v^{2/3}$. At four times lunar impact speed we would expect the Caloris Object to dig 2.5 times as deep—to 50 km. Was 20 km. a mere supposition? By my theory there is *partial* isostatic compensation, but losses are distributed across the whole basin, making compensation less critical.

was, however, a colossal crater, and this is now level. Isostatic upwelling from the mantle is held to have accomplished this for lunar maria. I detect uneasiness among those who advance the idea. Supplies of magma for the moon and Mercury are uncertain. It is even in doubt that these bodies have mantles, in our terrestrial understanding of the word. Other material was definitely at hand, with energy to mold it.

We have seismic processes to consider, and here, I specifically include vulcanology. We cannot measure to seventeen decimal places, doling percentages for such effects as impact flash, axial rotation, crustal slippage, and so on. Uncertainty is very generously covered, mainly, by the enormous

total power of the impact itself. This had resources to waste on *all* effects.

I gave the value in ergs. Earthquakes can be rated in the same terms. In the first place, they are ranked on the Richter Scale of Magnitudes. Readers who live near the San Andreas fault hear of this too often. . . . Ratings on it range from the humanly imperceptible. Yet I take it that a seismograph reacts when we drop a pound of lard one half-inch, to crash upon its base. I tailored the weight and fall to give a world-shaking tremor of Richter zero, which is 6×10^5 ergs. . . . Steps upscale rise by units and tenths, and the maximum normally quoted is Richter 10. This is mere convention; we're not restricted to counting on our fingers. Yet 10 has probably

never been attained on Earth. You will see good reason to pray that it never will. In fact, no quake on record has reached Richter 9.

I've been through an earthquake. At its epicenter in the Hindu Kush, this passed Richter 7. Further out, I witnessed symptoms at 5.5—onset of serious damage to buildings. My own symptom was onset of hysteric strength. I made my way to safety by hurdling a five foot briar hedge, unscratched. If that seems trifling, I was wearing army boots and took off from loose shingle. Try it sometime. I regret that I can't lay on an earthquake to stimulate response. That magnitude of 5.5 can show how we convert Richter magnitudes to ergs. The formula is simple: $\log E, \text{ ergs} = (\text{Richter Magnitude} \times 2.4) + 5.8$. This case is dead easy. $(2.4 \times 5.5) + 5.8 = 19$. Antilog 19 = 10^{19} . Nature used ten million million million ergs to scare me out of my wits. The same shock is provided by a two tonne meteorite which hits an airless planet at 30 kps. You can begin to envision results when the meteor weighs 2×10^{16} tonnes . . .

Here is a second example. The San Fernando quake, a decade or so ago, was set at RM 6.6; 1.1 magnitudes higher. $(6.6 \times 2.4) + 5.8 = 21.6$. The antilog of this is roughly 4×10^{21} . Four thousand million million million ergs: 400 times the energy of the 5.5 tremor. Upscale again: The 1906 San Francisco earthquake was at RM 8.25. $(8.25 \times 2.4) + 5.8 = 25.6$; antilog 25.6 = 4×10^{25} . Though the difference in magnitude is only 2.75, an 8.25 quake is four million times more energetic than one at 5.5! No quake has been rated

significantly higher than Alaska 1964, which was RM 8.6. That translates to 2.75×10^{26} ergs. *Twenty seven million times stronger* than my scare at 5.5!

You see, the Richter Scale is logarithmic. In fact, a unit step gives a factor in power of 251; it *multiplies* power by this. Notice—even that Alaska quake was nowhere near as forceful as our smallish asteroid, Vredevort II. We can translate the 4×10^{29} ergs of this into Essence of Earthquake. The equivalent is near as dammit 10. In fact, just over 9.9. 1,500 times the power of the Alaska quake.

What of the Caloris Object? We assign it a total energy of 10^{35} ergs. That's the order of magnitude. The figure could, reasonably, be five times as great, which would equal a Richter Magnitude of 12.45. The bare 10^{35} ergs equals RM 12.17 . . . Twelve on the Richter Scale is well below 10^{35} ergs—only 4×10^{34} , to be precise. As I see it, it is excess of caution to set the impact tremor at less than Richter 12 + . Now see its handiwork.

The shock travelled from Ground Zero at something under 8 kilometers per second. Even so, it took more than 80 seconds to pass the rim of the basin. As it expands, any tremor weakens. This tremor also encountered obstacles; it met cracks and cavities and inclusions in the crust. Each discontinuity obstructed its progress—and inevitably degraded vibration to heat.

Mercury's crust was wholly flawed, to depths of kilometers. Already, it was much as Luna's is today. Meteorites—some as large as those responsible for Plato and Copernicus—had

pounded it for an aeon. The rock had been milled to shatter-cones and powder. The inner planet's regolith was pulverised, fragmented. Every gap blocked the seism, degraded wave motion into heat. We do not know the rate of exchange, but small fractions of 10^{15} ergs amount to many calories. Even today, the temperature of that regolith exceeds 700°K . Like that of Earth it grows hotter with depth. Three aeons ago it was warmer still, far closer to the melting points of rocks than any oil-well in Texas.

The seism made up the difference. Rock fused at depth. The tremor below took over where the impact flare failed to penetrate. Like that of the radiation, the effect grew weaker outward from Ground Zero. Its main effort was in that broken regolith. Transmission was better through the solid rock below this. Yet it raced through both like a ripple across a pond. At the surface, similarity became exact. Here, the ripple was visible as such. But the medium was a mixture of lava and hot boulders. It was a kilometer high from trough to crest. . . .

Similar ripples traverse solid surfaces in quakes on Earth. San Francisco provided interesting photographs in 1906. The tremor lifted city pavings. Naturally, these snapped; the broken edges jammed on high, left to caricature the wave-form in hard concrete. The aftermath of disaster saw repairs in San Francisco, the evidence is no longer on view. The Caloris Object left a perennial marker.

This marker will be destroyed only when the sun reddens, expands, and

swallows Mercury. The monument is that ring-range, a stockade of rock over 4,000 km. in circumference. Take its breadth as 150 km., and it towers to heights of one kilometer. We can credit it with a volume of 300,000 cubic kilometers. (If you are unhappy with metrics, divide by four for the volume in cubic miles.) It masses roughly 10^{15} tonnes of rock.

We can calculate the energy needed to raise that mass against Mercurian gravity. Be ready for a surprise.

The cost is an order of magnitude *lower* than the power of Vreedevoort II, about 4×10^{28} ergs. This in itself is food for thought as it is a completely negligible fraction of the power of the Caloris Object. Mind you, there was more to the operation than elevating rock. The tremor left debris hotter, pulverised it further. Allow generous margins: set total expenditure on the ring-range at 10^{30} ergs. Richter 10 plus, about one part in 60,000 of the total energy of the tremor.

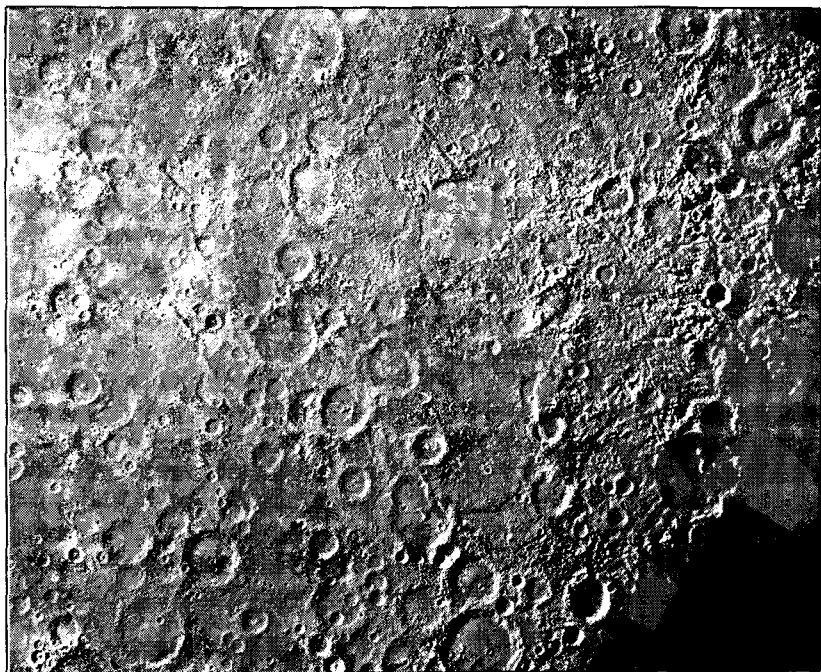
The bill seemed much too low. I gagged at it. Then I recalled the Tokyo quake of 1923, which was certainly less than Richter 9. It had fantastic results. One part of the floor of Sangami Bay rose 820 feet. Nearby the seabed moved the other way, sinking 690 feet. A relative displacement of close on half a kilometer! The work of raising the ring-range was casual, incidental . . . (Note: Mercurian gravity is less than four-tenths that of Earth.) Before it reached the ring-range, the Caloris tremor was at least sixteen million times as powerful as the Tokyo seism. It built that fold with a mere fraction of its power.

Having done so, it raced on, still above Richter 11. There was power for several dozen circuits of the planet. It dwindled on every tour, and at last damped to extinction. The first half-circuit found it still strong and frisky. Here it produced the third seismic effect, as mentioned earlier.

The tremor spread from Caloris around the globe in all directions. Inevitably it met itself. As inevitably, the rendezvous was 180° around the planet on all headings—at the antipodes of Ground Zero. This area has been christened the Weird Terrain.

Where ripples meet, they interfere. Troughs and peaks cancel and redouble. Basically the Weird Terrain is an interference pattern, cast in three dimensions. Mariner Ten pictures hint at the wavelength! But the pattern is mountains and mesas. The seism transformed Mercurian topography at the longest possible range. The Weird Terrain's area is less than that of the ring-range; the scale is less extensive. We are still tempted to see it as work at Richter 10.5, or thereabouts. This overlooks a salient truth: the tremor was sharply focussed there. To see it at its worth,

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"Weird Terrain" or "Peculiar Terrain" roughly opposite Caloris Basin is seen at right side of this Mariner 10 Mercury photo provided by the National Space Science Data Center.

imagine the jumble of mountains and mesas to be stretched out along, say, the Mercurian equator. This reduces heights. We have concentrated effort at little more than Richter 9, perhaps. The attenuation of such a giant tremor across the little planet seems to be more than 2 RM but less than 3 RM. Can we carry this across space from Mercury to Earth? Can we put rough markings on my rubber yardstick? They will be guesstimates, but these may lead to something better.

Keep in mind: a Richter Magnitude is a power factor of 251—two, a step of 63,000; five, a million million times. (The last figure is exact, and that's no accident. Nor is it a coincidence that five *stellar* magnitudes give a factor of exactly 100. Both scales are tailored for convenience.)

Vredevort II has a total power of Richter 10 minus. Let us say that the seismic shock is at 9.75. How does that carry across our world?

Earth is bigger than Mercury. That works to increase attenuation. On the other hand, seismic reflections from its iron core swing back to the surface at about the same distance as that from Caloris to the Weird Terrain. Further, our crust is less flawed than that of Mercury. Our molten mantle may well transmit vibrations more efficiently than the interior of Mercury. The Lisbon earthquake, two centuries back, was one of the greatest disasters on record. The shock was felt beyond the Urals. The epicenter was probably below ocean, west of Lisbon—tsunamis were worse at Cadiz than at Lisbon. Yet it caused serious damage 700 miles *east* of Lis-

bon at Algiers. It was noticed across four times the area of Europe. I draw support from all this for a prediction. A Vredevort II will cause *direct* shocks at RM 7 plus 5,000 miles from the impact point. Nor will this be all.

In a sense, a normal quake is like the firing of a cannon. A charge waits in the breech until the lanyard is jerked. Earthquakes unleash similar latent force. We know the cause of most. They come from strains in the crust of the Earth. For land masses, this is a 40 kilometer thickness of granitic rocks. Under the oceans it is thinner and of basalts, rather than acidic rocks. But ocean crust shares much with that of continents. Both are formed from separate individual rafts, on platons. These may be wide as Asia, or as small as Iberia. Though India is joined to Asia, and Spain to Europe, both are distinct platons on their own.

In general, platons are made of lighter rock than the mantle below. They *float* on this. They are like a flotilla of rafts which is as tightly jammed together as can be. And like rafts, they drift on eddying currents in the mantle. We may see those currents as circulating by convection, like soup in the saucepan. Streams of rock rise from the depths, pass beneath platons, then dive into the depths again. Their pace is slower than any glacier's—an inch or so per year. This, however, will open up an ocean in a megacentury. In the early Jurassic, the Americas nestled against Eurafica. The two land masses joined at what are now their continental shelves. The passage of 150,000,000 years has set the Atlantic between them.

Mantle circulation has a dominant pattern. Currents rise beneath and form mid ocean ridges and spread out both ways. At continental shelves they meet similar flows from beneath land masses. Both dive side by side back into the mantle, like converging travellers. Trouble brews when drift brings platons to collide or chafe. India bulldozes into Asia. That collision folded the Himalayas to their present height.

Chafing works beyond the Rockies. Western California secedes northward from the Union. Their uneasy marriage tears apart along the San Andreas fault. A clean break is delayed by friction and interlocking. Stresses mount for decade after decade. They have raised part of California in an enormous blister. At its peak this is now about 50 cm. above its normal level. It comes from a horizontal thrust, like the flexing of a sheet of tin when we press on opposite edge. In the end, that thrust overcomes resistance. Interlocked projections shear. A fusillade of jolts grinds mating surfaces to a polish. (Geologists burrowed along the face of a Scottish fault. They uncovered a surface still showing the polish it acquired in the Cambrian, 450,000,000 years ago.)

Power accumulated over decades is spent in horrendous minutes. The western platon moves ahead to the north; the blister subsides. The subsidence and horizontal jolting both cause seismic tremors. These spread cross-country, like ripples through a pond. They bring freak results such as the concrete caricature of wave-forms. Sand geysers spout from the ground 300 miles away. Seismographs on the far side of the

world register the vibration.

Near the fault, effects are less diverting. The tremor shakes down buildings for miles around. Fences, roads and buildings which straddle the fault are torn asunder. The broken ends are sprained by a dozen yards. There may also be vertical movement, like that beneath Sangami Bay. In 1906 this "stepping" on the San Andreas fault was limited to a yard or so. The 1964 Alaska quake produced a new cliff twenty times as high. Commonly, stepping works less damage than horizontal shift; we plan our buildings to resist a vertical strain—that of gravity.

The main point is this: power loosed by normal earthquakes is no instant creation, like the meteorite's. It builds up below our feet for years, decades or centuries; potential accumulates, then becomes kinetic. At San Francisco, a potential of 10^{25} ergs became kinetic at Richter 8.25. The potential is rising again. The next quake there may well reach the same level.

It seems that any fault will yield and move at an impact handing out the excitement it is due to deliver itself. Surely, less provocation can turn the trick. Quakes proceed by a salvo of jolts. Catastrophe follows the falling domino pattern. Less strain will shear a given projection. This piles bigger strain on a stronger, neighboring interlock. That, too, yields, and so on. Like that jerk upon the lanyard, a small investment triggers the total power stored. The impact tremor falls below San Fernando strength at distance, but detonates a San Francisco quake. Subtler measures work; water has been pumped

down boreholes and thence between the faces of a fault. The fault then moved. The tremor from an impact can certainly release more than it delivers, at long range.

Take an ocean impact near Tahiti. This triggers local quakes 5,000 miles away, along the American Cordillera, from Alaska to Cape Horn. These local quakes interface, like the Caloris tremor at the Weird Terrain. Highly localized shocks occur at spots between them, even at areas previously seen as immune from trouble.

Some twelve hours after the shocks, a tsunami hits western coasts with unbelievable fury. We can foresee its height. In our lifetime, a tsunami from an Andean earthquake flooded shores in Hawaii. *This* tidal wave is generated by a seism with 1,500 times Andean power. A tsunami carries energy with very high efficiency. It's no pessimism to expect a seismic surge measuring 200 feet from trough to crest. At several thousand miles!

Most—but by no means all—quakes come from fault movements. Some have epicenters well below the crust at depths of 100-700 kilometers. Seismologists are coy on happenings there. Rightly so. Even indirect evidence is scanty for these sites. We can feel sure that faulting is not involved. A load of several hundred kilometers of rock leaves little room for this.

I see a likely mechanism—phase-change in the minerals of the mantle, that is, transformations from form A, of given density, to form B of that substance, at another density. Such changes seem certain to occur and increased

pressure is the likeliest agent to cause them.

Circulation through the mantle will recycle both varieties. There *is* a turn-around, though it's timed in megacenturies; the situation cannot be static. Masses of material await change. At any moment, there will be enormous layers of form A just above the critical depth.

Vredevoort II sends out a seism of abnormal power. Pressure is increased on form A mineral near transformation point. This switches to form B; a huge volume of the substance contracts. The percentage change is minute—but the mass involved is enormous. We foresee a seismic chain reaction. This proceeds round the globe, hundreds of kilometers beneath our feet. We cannot foretell the consequences.

I think the mechanism likely, but at present there is no proof. In fact, we have better hope of exploring planets of other stars than the depths of our own mantle. The phase-change business is hypothesis.

The leashed power of crustal movement is fact. Its triggering by an impact, certain. Fellow ghouls can choose their own Most Lethal Target, but consider mine. This is in the Arabian Sea, west of Bombay. Draw a circle round it at a radius of 5,000 miles. Then count seismic risks within the ring. There is the Himalayan/Alpine fold; Japan, the Philippines, and Indonesia; the Great African Rift Valley, dotted with volcanic warning cones; the Red Sea, whose heat is partly geothermal, its water laden with metals leached from the upper mantle. Southeast, the Indian Deccan

is a single blanket of lava. Cracks from which this welled may be glued securely, but I wonder. Less obviously at risk, North China recently presented the highest seismic butcher's bill in history. . . . It's exaggeration to class the solid Earth as stable. Seismographs across the world register 800,000 separate shocks per year. That's one every 40 seconds; on average, one per year for every 24 kilometer square of surface. These make changes in the world.

Another change has always puzzled me, another dog that did not bark in the night. Our three land masses, Eurafasia, Australia and the Americas, are *new*, so is every ocean floor. None are as much as 5% of the planet's age. Before them was Pangaea, one continent, embracing all the land there was. Sore feet permitting, the Diplodocus could walk to any destination in the world. Pangaea fissioned. Continents crawled apart. That motion signified change of circulation in the mantle. The mystery is—why did subterranean currents change with 95% of Earth's history elapsed? Perhaps they changed before. Maybe, earlier continents went their own ways, then merged to form Pangaea. That seems a dicey merger . . . and also betokens changes in that circulation.

The enormous scale must ensure that change is rare, yet it occurs. What is its cause? Water boiling in your electric kettle seems to churn at random, the churning however follows its own laws. On a larger scale, at vastly slower pace, circulation in the mantle may also be stochastic. I would be unsurprised to hear that it is driven by phase-changes as much heat-transfer. But could outside

agencies interfere with its pattern?

Only one factor seems big enough to fit the bill—asteroidal impact. Yet the impact must be limited in size, for you read this today. A Caloris Object would leave Earth free from biological oddities, including you and me. That seems to throw us back on an impact with some catalytic effect. Say, interruption in the circulation by a chain of phase-reactions. After which, circulation builds itself anew. The renewal of the seabed would obliterate the evidence. . . . so at present the idea has the same validity as any other, precisely nil. That perhaps is better than parity, for I hear no other theory.

We even lack evidence that Earth received the same treatment as Luna and Mercury. Its first aeon left them as pockmarked as they remain; weathering and continental drift removed the traces of that early era here. The astroblemes we know were sporadic latecomers. Yet lunar maria and Caloris prove that there were later impacts. Now life's origin here has been pushed back to 3½ billion years BP. This may be the earliest possible date. The Age of Caloris may set the startline.

A similar event could determine the finish. There have been sporadic salvos of large impacts since that first aeon. Vredevort was one of the more recent bursts. In December 1979, English astronomers advanced a possible explanation. Sol tours round the Galaxy every couple of megacenturies. Some corners of the spiral arms may be heavily charged with solid debris. Passage through these is responsible for increases in impacts.

A mercenary conclusion. The first iterations of lava pouring into the Caloris crater were hot and fluid beyond all earthly magma. Now Mercury is as dense as Earth. Its rocks contain as much metal as our own, more perhaps.

This is what I visualize. Infill for that incandescent crater began and stayed *hot*. It took decades and centuries to cool. Heavy, noble metals sank to the bottom. Temperatures were too high for non-volatile, ignoble metals to stay in chemical combination. These reduced and sank upon the heavier stuff. Megatons and gigatons, all in one resplendent plug, neatly stratified by density. Who will join me in floating an issue of Caloris Mining shares? ■

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Name (please print) _____

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City _____ State _____ Zip _____

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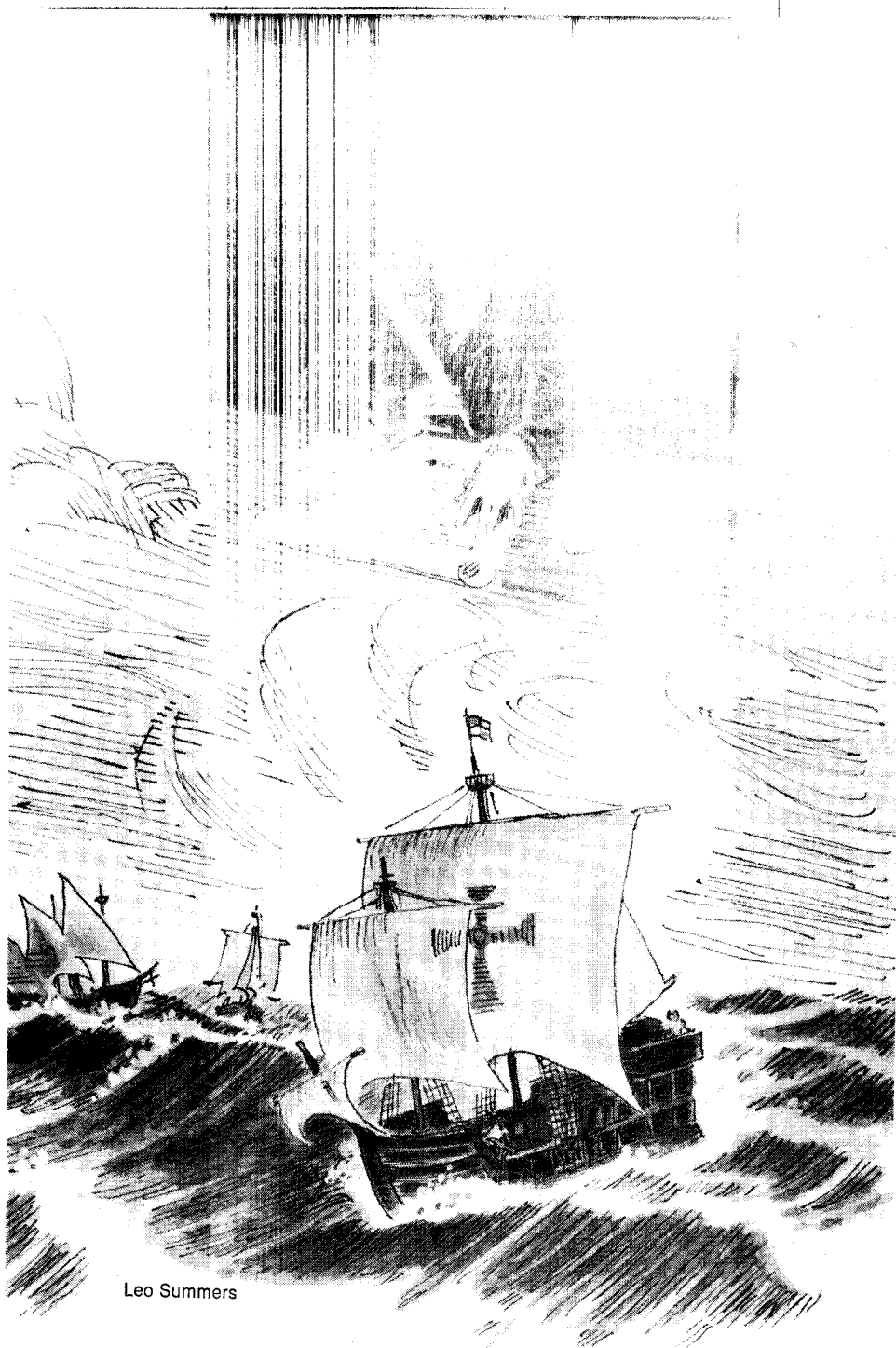
H1AAW6

If only
modern management
methods had been
available a few
centuries sooner.



**Al
Charmatz**

SAILING THROUGH PROGRAM MANAGEMENT



Leo Summers

Your Excellency:

Please convey word of this victory to our most illustrious King and Queen. Glorious news! The Expedition to the Indies has returned safely, having discovered and claimed new lands!

After sailing for 70 days, at 2 A.M. on October 12, 1492 we first sighted land. We sailed for a further three months, exploring, charting, sighting and landing on many islands, meeting natives, and trading for objects of gold.

In December we lost the Santa Maria on a reef. On March 4th the Nina anchored at Lisbon for refit and returned to our home port with the Pinta on March 15.

We will make celebrations and give solemn thanks for the great exaltation which this victory will have.

Christopher Columbus
Admiral of the Ocean Sea

To: C. Columbus, Admiral of the Ocean Sea (AOS)

From: Program Manager/Dept. of Discoveries

Leon and Castile National Sea Laboratory

Symbol: PM/DOD (LACNSL)

Subject: Operational Procedures

1. Because our reorganization occurred while you were away on official travel your lapse from proper procedures will be overlooked this time. However, in the future you will refrain from communicating with the Sovereigns.

2. You will submit your program plan for a proposed second voyage across the Western Ocean directly to this office.

To: C. Columbus, AOS

Fm: Chief, Administration

Subj: Matrix Management System

1. Because LACNSL has expanded and accepted increased responsibilities, we have instituted new regulations and reorganized our management structure, applying the management procedures that have proven so effective in the Department of Exploration (DOE).

2. In this matrix management system each employee knows exactly who his supervisors are. In its ultimate form he is placed within a line or functional organization: pilot-navigators in the Navigation Division, seamen in the Labor Division, cabin boys in the Supernumerary Division, soldiers in the Protective Force Division, clerks and pursers in the Personnel Administrative Division, etc. Individuals are then selected and assigned to specific programs. Their work is directed by the line managers with coordination by the program managers. They report in both directions (vertically, within the line organization, and horizontally, to the program manager) as circumstances require. Certain individuals may work on several programs simultaneously and thus report to a number of program managers. Rumors of simultaneous assignments to different fleets are false.

3. In your specific situation, voyages of discovery are handled by Program Managers in the Department of Discoveries (PM/DOD). Specialists in details of the areas to be searched are placed in the appropriate Explorations functional organization; you are in Western Explorations (WX) Division.

To: PM/DOD

Fm: C. Columbus, Admiral of the Ocean Sea

Subject: Personnel Reassignment

Assigning people to Divisions by discipline means you are breaking up good, established teams. Our crews and officers have built up special expertise and have high morale, which we will need for our Second Voyage.

Furthermore, you cannot pirate our people to staff your expanding program offices if you expect us to do well in the future.

To: C. Columbus, AOS

Fm: PM/DOD

Subj: Personnel Complaints

1. Piracy is a hanging offense and you will not use that word.
2. We decided it is most efficient to assign people to Divisions by discipline (Navigation, Labor, etc) even if it did mean breaking up established teams. For too long, special tasks and programs have been assigned to small teams. The crews of your three previous vessels are prime examples of this elitism. We have decided the overall organization will benefit if we rotate personnel to new assignments as the tasks open up, thus ensuring a more universal distribution of skills. That explains why we have reassigned your pilot-navigator to the Northern Fleet, searching for the Isles of the Blessed. Your new pilot-navigator is a recent graduate of the Famous Navigators School and we are sure he will do an excellent job. As a new graduate his salary is lower, which will help your budget.
3. You seem to be unable to understand the rationale behind reassigning personnel, with your whining about "morale" and "breaking up good teams." From the viewpoint of management, "every-

one in his box and a box for everyone" simplifies our task immensely. If individuals are assigned to functional organizations that they believe they do not belong in, it is their own fault; they should have planned ahead when they began their apprenticeship. Morale problems, if they really exist, are your concern and not that of the management. You, not we, have the responsibility of getting the assigned task done. The best organizational experts and consultants have told us we are correct, and we see no need for another Employee Attitude Survey. You sailors are all complainers, anyway.

To: C. Columbus, AOS

Fm: PM/DOD

Subj: Written Reports

1. Because some interest in your first voyage has been expressed by the funding agency, our office has decided to publish formal reports.
2. You will furnish us with two reports, an unclassified one written in the style of "Scientific Spaniard" and a classified document. The second report will be classified S-NSI (Secret-National Sea Information) and must be classified by paragraph.

To: C. Columbus, AOS

Fm: Parking Compliance Office

Subj: Parking Violation

1. Parking regulations have been established and will be found in the Supervisors Manual. You are in violation in the following respect: Ocean-going vessels are divided into two categories, compact and full-size. Vessels with cargo capacity of 50 tonnes burthen or greater are defined as full-size.

2. On 14 March 1493, you dropped anchor on the Nina and the Pinta in the compact vessel portion of the roadstead.
3. A citation has been issued and you are fined, which fine shall be deducted from your wages.
4. If you wish, you can file a written complaint to the Parking Hearing Officer, who will render a decision which will be final and binding on all parties.

To: Parking Hearing Officer
Fm: C. Columbus, Admiral of the Ocean Sea
Subj: Parking Violations—Nina and Pinta

On March 14, 1493, our ships returned from a seven month voyage. Upon arrival in the roadstead we found mooring buoys labelled "C," which we believed meant "Caravel," not "Compact." I appeal the fine on the basis of not having been notified of these procedures.

By the way, I cannot find anything on this subject in the Supervisors' Manual. The manual is so overcrowded now that I cannot fit new bulletins into it as they are issued. Surely, the sign of a decadent organization must be an overweight manual of procedures. We have rules and regulations for everything, with procedure more important than substance.

To: C. Columbus, AOS
Fm: Parking Hearing Officer
Subj: Parking Violations
1. Rejected. Ignorance is no excuse.

To: C. Columbus, AOS
Fm: Fiscal Management Office
Subj: Call for OPLANs

1. You will prepare an Operating Plan for Fiscal Years 1493 and 1494, which shall include a month-by-month projection of costs, expressed in terms of both manpower and money. You are to count on-board support people (cabin boys, clerks) as 0.5 Full Time Equivalents; everyone else is one FTE each. You should indicate an expected attrition caused by scurvy, fights, storms, hostile natives, sea serpents, etc, and you should account for this diminution of staff. You are, of course, authorized to recruit help from the natives; carry them as non-salaried crew members.

2. You have not yet submitted your formal work statement (Revisable Program Description) to us and to PM/DOD for FY 1493-1498. You claim that you will search, search, and search again until you find the direct route to the Indies. We require that you submit your plan for search and research, with milestones, expected discoveries and the benefits therefrom.

To: Fiscal Management Office
Fm: C. Columbus, Admiral of the Ocean Sea
Subj: Planning Documents

I cannot go into detail you require regarding a five-year search plan or work statement. If I knew what I will be doing in five years I would be doing it now.

In costing-out the annuals OPLANs I find the indirect costs (overhead) are rising excessively. Currently at 60% of direct (salary, etc) costs, they seem to be increasing by ten points per year. If this continues, in FY 1498 they will equal 110% of direct costs. Can you find a way to control them?

Also, the 5% surcharge imposed by the Program Managers Office is excessive. I resent having to subsidize those who are harassing me. Do you realize that we have to teach the managers what we do, so they can then supervise us?

To: C. Columbus, AOS
Fm: Fiscal Management Office
Subj: Financial Policies

1. It is true that indirect costs are increasing. However, they are calculated as a fraction of your direct costs. If you do not gain control of your direct costs and operating and maintenance costs, you will be forced to reduce the wages of your crews or sail with fewer personnel or ships. We intend to cut the fat from your budget.

2. You should be pleased to learn that we have decided to maintain the ratio of in-house managers to staff at the current level. We realize that the managerial staff cannot continue to expand, so we have recently sent a Request for Quotations to outside agencies, seeking management, administrative, and technical skills. These organizations will assist us in coordination and management. The cost will come out of overhead.

To: C. Columbus, Admiral of the Ocean Sea
Fm: WX-Division Leader
Subj: Harassment

You are fortunate that the managers ask you to teach them before they begin supervision. Other fleet commanders have not been so lucky. Hang in there.

To: C. Columbus, AOS
Fm: PM/DOD

Subj: Planning

1. Your long range plans have been reviewed by the SMG (Senior Management Group) and our consultants, the DODDERERS (Deputy Over-Directors Doing Early Retirement and Extended Research). They find your plans elusive and insubstantial. More detail is required.

To: PM/DOD
Fm: C. Columbus, Admiral of the Ocean Sea
Subj: Paperwork

Is it true that paper is now our most important product?

To: C. Columbus, AOS
Fm: Equal Employment/Affirmative Action
Subject: Employment Conditions

1. During your recent voyage you claimed new territories for the Crown.
2. In your OPLAN you describe the natives you recruited as "unpaid crewmen." Although these crewpersons are not full citizens they live in Crown territory and must be accorded the rights of citizens. They must receive the minimum wage. Furthermore, you will prepare a training plan to upgrade their qualifications so they will become eligible for more responsible positions.

To: C. Columbus, AOS
Fm: Associate Director for Exploratory Sciences
Subj: Performance Appraisals
1. Please prepare evaluations of your senior staff, describing their assignments and performance during the recent voyage. In turn, they will prepare evaluations of their subordinates.

2. This year, we will include a summary word describing each employee's overall performance: outstanding, very good, satisfactory, marginal, or unsatisfactory. Note that, by definition, "outstanding" requires consistently exceptional performance. "Satisfactory" means that the job requirements are being met.

3. You should have very few outstanding people, probably no unsatisfactory performers, and very few marginal ones. Effectively, you will be categorizing your personnel as satisfactory or very good. Please try your best, especially in selection of the one-word summary. Remember a key part of the Hippocratic Oath: "First, do no harm."

To: PM/DOD

Fm: C. Columbus, Admiral of the Ocean Sea

Subj: Publications

-Our article appeared in "Scientific Spaniard" under your name, not mine, and the acknowledgements were omitted! Explain this theft!

Our classified article appeared verbatim in "Nautical Week and Sea Technology," including the figures, charts, graphs, and tables. Only the classification labels were removed. This is an obvious violation of security regulations. Also, the only name mentioned is yours!

To: C. Columbus, AOS

Fm: PM/DOD

Subj: Publications

1. Obviously only the names of Program Management personnel should appear on external publications. It is our function to interface with outside agen-

cies. Our sponsors, the funding agencies, deal with us routinely and would only be confused if we brought in the names of people they have not met.

2. Classification is what we say it is. "Nautical Week" would not even look at our reports, let alone publish them, if they were not classified.

To: C. Columbus, AOS

Fm: Parking Compliance Officer

Subj: Parking Violation

1. Our records show this is your second violation

2. Yesterday a small, oar-propelled craft, safety-rated for six persons, was tied up along the Full-Size Vessel section of the pier.

3. As commanding officer you are responsible. You are hereby issued a citation and informed that a fine has been imposed, which will be deducted from your wages.

4. Future violations will be met with administrative measures, commencing with a suspension from duties without pay.

5. You may pursue the established grievance or administrative review procedure (see the Supervisors Manual on Corrective Actions and Administrative Review).

To: C. Columbus, Admiral of the Ocean Sea

Fm: WX-Division Office

Subj: Appraisal of Your Performance

We really wish we could have rated your performance during the current review period as "outstanding." However, the definition requires consistently exceptional performance and we find from the log books that several periods

of time elapsed during which you did not discover new lands. Furthermore, you did lose the Santa Maria. We would have rated your performance only as "very good," for those reasons.

However, the program manager who has cognizance over your activities has direct input into your performance appraisal. He stated his displeasure at your failure to provide the necessary documentation and other paperwork he asked for. He could not rate you as "unsatisfactory" because of your positive accomplishments, but wished to rate your performance as only "marginal." We compromised and your performance rating is "satisfactory."

For "Development Plans" the program office expects you to devote more attention to the following procedures established by the organization.

To: WX Division Office
Fm: C. Columbus, Admiral of the Ocean Sea
Subj: My Performance Appraisal

To: PM/DOD
Fm: C. Columbus, Admiral of the Ocean Sea
Subj: Scurvy

On long voyages crewmen are coming down with scurvy. Can you work on finding a cure?

To: C. Columbus, AOS
Fm: PM/DOD
Subj: Advanced Development Program
1. You asked that a cure be found for scurvy.
2. You were able to return from your voyage with most of the crew alive, so this appears to be a needless expendi-

ture; we must watch our budget.

3. Solution to the problem of scurvy is of long-term interest and we encourage your work in this field. We suggest you prepare a program plan and submit it to the Office of Advanced (Non-programmatic) Research and Development. We have no funds that we can dedicate to this task. Perhaps you can obtain funding from them.

To: C. Columbus, AOS
Fm: Training Office
Subj: Upgrading of Native Crewpersons
1. We understand you are having problems qualifying for higher ratings the crewpersons you acquired on your Western voyage. We would like to help.
2. We have reorganized the Training Office with enlarged staffing, so now we can take on training of non-citizens. We also have instituted a bilingual education program.
3. Unfortunately, we cannot send the crewpersons to our special school because the "travel-for-training" budget has been cut.
4. However, be assured that we have every confidence in our capability to help your people. We have correlated our Figures-of-Merit (number of training office personnel per student, and cost of training per student) and find them both in phase and increasing, so we know we are doing well. We are doing very well indeed.

To: All Employees
Fm: Director
Subj: Family Days
1. On the second weekend in June all facilities and vessels will be open to the public.

2. You will arrange displays, tours, and demonstrations. They must not interfere with the orderly pursuit of work. All areas will be clean and safety hazards eliminated. Money will be taken from the Recreation Fund and used to pay for minstrels to entertain the visitors.

To: Master Supervisors List

Fm: Administration

Subj: Professional Titles

1. The Senior Management Group (SMG) has decided that all employees should be numerically graded. We will start with the seamen (SMs), giving them a rating level of SM-1 up through SM-9.

2. You will assign a rating number to each SM, based on your evaluation of qualifications and performance, considering training, education, experience, seniority, and general worth to the organization. Guidelines will follow.

3. It is imperative that all SMs agree that the rating level assigned them is fair. Remember, they will compare their ratings against that of their colleagues pulling on the same capstan bar or setting the same sails, and they know their own worth at least as well as you.

4. We are certain that once we have a box for everyone and everyone in his box the organization will run more smoothly.

To: C. Columbus, AOS

Fm: Equal Employment/Affirmative Action

Subj: Underutilization of Minorities

1. After SMs were given numerical ratings we determined that there is an underutilization of minorities (from the new Western islands) in upper levels.

2. It is our policy that certain goals be met, for which purpose this department will work closely with you.

To: C. Columbus, AOS

Fm: PM/DOD

Subj: PM Representation

1. Should your second voyage be approved, representatives of the Program Manager will accompany you for the purpose of negotiating with the Great Khan. Our office will contract for the exchange of goods and services and will arrange delivery schedules. You will not conduct any negotiations by yourself. Any meetings must be attended by our official representatives. Those individuals will have the final say, and will inform you of your responsibilities in meeting the cargo delivery schedule, etc. Failure to comply with the schedules will reflect adversely upon your next performance appraisal.

2. We are certain we will have your cooperation, especially if you wish to have your theories vindicated. Remember, we have many junior Program Managers who have not yet been to sea and who are eager to go. Several will be aboard as observers, critiquing your decisions and debriefing you at the end of each watch. They will send periodic letter reports by carrier pigeon. We will judge the success of your next voyage by the regularity of those reports and their description of how well you function as a member of the LACNSL team.

To: WX-Division Leader

Fm: C. Columbus, Admiral of the Ocean Sea

Subj: Options

I believe I have only two choices left:

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follow these fantastic procedures or take early retirement. Have you any advice?

To: C. Columbus. AOS
Fm: WX-Division Leader
Subj: Options

Hang in there; sanity must return.

By the way, I am approaching the mandatory retirement age myself and will be leaving soon. Have you considered applying for my job? It involves desk work instead of field work and a different degree of harassment, of course.

To: Director
Fm: C. Columbus, Admiral of the Ocean Sea
Subj: Is Paper Really Our Most Important Product?

The enclosed files (three mule-loads worth) will show you the difficulty I have had in getting my job done. Can you help?

To: PM/DOD and WX-Division
Fm: Director
Subj: Columbus
1. Who is this C. Columbus person? My office has never heard of him.

To: WX-Division Leader
Fm: C. Columbus, Admiral of the Ocean Sea
Subj: Options

No thanks; I wouldn't want your job. At least I can go to sea now and then.

I had considered moving West to the Leeward Lisbon Laboratory (LLL) but they discovered hybrid matrix management before we did, so they must be in even worse condition. I cannot set up my own company of merchant adventurers and explorers because of the gov-

ernment monopoly, so I will indeed just "hang in there." I will be going to sea soon; I may even decide to come back.

To: C. Columbus. AOS
Fm: WX-Division Leader
Subj: Second Voyage

Afraid it's too late. This morning, without notifying us, the PM/DOD sent the fleet to sea. They encountered a severe storm and went down with all hands. It will be interesting to see how they get out of this one.

To: Director
Fm: PM/DOD
Subj: Investigation into the Loss of C. Columbus' Fleet

1. A court of Inquiry, consisting of members of PM/DOD and the DOD-DERERs, has investigated the loss of the C. Columbus fleet.

2. We concluded that loss of the fleet was caused by the failure of C. Columbus (formerly AOS) to make adequate preparations and to follow the prescribed procedures.

3. We recommend that C. Columbus be tried and executed.

4. Furthermore, it is apparent that this failure to adequately prepare for sea was due in part to our inability to exercise sufficient and close supervision over day-to-day details. Thus we further recommend that the Project Manager's staff be enlarged, including supplementary in-house personnel, resident consultants, and outside contractors.

To: PM/DOD
Fm: Director
Subj: Court of Inquiry Findings and Recommendations

1. Accepted ■



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Janet Aulisio

GREEN WINTER

F. Paul Wilson

When two beings disagree
there's a good chance one of them
knows something the other doesn't.
But it can be very difficult to tell which.

The knife made a crisp, rasping sound as it sliced through Veneem's skin. The area over the left deltoid had been numbed with ice before the procedure and he felt only a sensation of pressure, a mild discomfort.

The dark green of the epidermis parted cleanly to reveal the lighter dermis below. This in turn gave way and exposed the pink of the subcutaneous fat. Blood appeared in a slow, red ooze as the doctor completed the elliptical incision around the growth. It was a tiny hand and forearm this time, mottled green with minute, articulated fingers. Veneem had put off the excision for as long as he could because the growths so often withered and fell off on their own. But this one had kept on growing, so now he was back at Dr. Baken's adding another scar to his collection.

As the segment of skin supporting the growth was removed, blood filled the cavity and overflowed onto the arm. The doctor quickly wiped it away and began suturing. Three deft ties and the wound was closed. After a compress was applied and a clean cloth wrapped around the area to hold it in place, Veneem rose to his feet.

"See you in five or six days," Dr. Baken said, dropping the excised growth and the excess thread on the garbage pile in the corner. "Those sutures ought to be ready to be pulled by then."

Veneem nodded. He knew the routine. "Tell me something," he said after a pause. "Don't I get an awful lot of these things?"

"No, not particularly. They're fairly common in regenerated limbs but the incidence varies between individuals. I've got a number of patients who need

excisions far more often than you."

Veneem nodded with an overt lack of concern. He didn't want the doctor to think him overly conscious of his health—that would be unseemly for a hunter.

"How's Rana?" Baken asked.

The question surprised Veneem. The doctor had met his daughter, of course—he had been to the house often enough during the early stages of the arm's regeneration, and during Nola's final illness—but he didn't think Rana had made enough of an impression on the man that he'd be asking about her.

"She's well. If I can keep her out of trouble she'll make someone a fine wife someday."

Baken smiled. "If she stayed out of trouble, she wouldn't be Rana."

Veneem had to agree, yet he wondered how the doctor could make such a precise observation. He brushed the matter aside—everyone knew Rana. Now to the matter of settling the fee.

"Get you a rabbit for this—that do?"

"Nicely. Before the half-moon, if you can. My meat supply is getting low."

"You'll have it tomorrow or the next day." He took his fur jacket from a hook on the wall and gingerly slipped his left arm in first. Veneem was of average height and heavily muscled, more so than most hunters, but moved with a feline grace that was the *sine qua non* of his profession. With the jacket cinched securely around him, he covered his shiny green scalp with a cloth cap, nodded brusquely to Baken and stepped out into the cold.

His eyes immediately scanned the ground for game tracks. Sheer reflex—he

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knew he'd find nothing; the ground around Baken's hut was an indecipherable clutter of comings and goings and waitings-around. Pulling his horse out from the shelter, he slid up onto its bare back and trotted eastward along the road. Denuded trees stood stiff and still on either side as an icy grey sky threatened more snow.

Veneem liked snow. He detested the cold that came with it, but winter was inevitable, and so if it must be cold, let it snow. Let it be a wet snow that stuck to the trees and etched them in white against a darkening sky. Let it snow briefly, frequently, no more than a finger's breadth at a time—just enough to erase the stale tracks and highlight the fresh. At such times small game hunting was as easy as picking wild berries.

He was perhaps halfway home when a movement, a darting shape in the thicket to his right, caused him to pull his mount up sharply and peer into the gloom. His searching eyes found nothing. He could have sworn he'd seen a shadow moving in a tangle. A big shadow. Almost big enough to be a hairy. He cursed the overcast sky. If the sun were out he'd have a better chance for a second look . . . if there was really anything there to see.

His eyes weren't what they used to be; hadn't been for a few years now. This was no casual admission—it was his most carefully guarded secret. He was a hunter and his eyes were his life, his reputation, his means of support, his protection.

Protection! He snorted a disgusted puff of fog into the air. If his vision had been better perhaps the bolt he'd loosed at that charging boar would have found

its eye instead of glancing off its skull. Perhaps then the enraged beast wouldn't have butted Nola, half-crushing her chest, nor gored his left arm so badly that Dr. Baken was forced to remove it at the shoulder. The arm took a full five seasons to regenerate. Nola died of the fever shortly after the accident.

And life had not been quite the same since.

No sound, no further movement came from the thicket. He strained to see, but the outlines of objects began to blur beyond two man-lengths. He saw nothing out of the ordinary. Couldn't have been a hairy anyway—they simply weren't seen around here anymore. Just as well . . . his crossbow was at home.

Giving the horse's flanks a jab with his leather-shod heels, he continued on his journey. As he turned off the main road onto the path that led to his home, his gaze roamed the ground in search of wheel tracks. There were none. He began to curse softly and steadily as he rode and was in a foul mood by the time he reached the house.

"Rana!" he called after tethering his horse to the nearest low-hanging branch. The main structure of the house was a low dome of hardened clay with four small windows—boarded now against the cold—and a single entrance. Pushing aside the double hanging of cured hides that covered the doorway, he entered and called again.

"Rana!"

The girl came out of one of the two sleeping rooms at the rear of the house. She had her father's long face and high cheekbones, but her dark eyes were her mother's. The fire in the hearth flickered off her face and bare scalp, darker

green than usual now due to the increased time she was spending indoors. It was warm inside and she wore only a simple tunic that hid her thin, wiry frame and reduced her small breasts to almost imperceptible swell.

"Something wrong?" She was nineteen summers and spoke with a clear, high voice.

"Yes! The delivery was to have been made at sunrise today. Absolutely no later—the Elders promised!"

"We still have some cheese left and there's plenty of meat."

"That's not the point. The supplies were supposed to be here by now and they aren't!"

"I'm sure you have a pretty good idea of why they're late," Rana said after a short pause.

"I don't have any such thing!" he lied and pulled his jacket off with angry, jerking motions, oblivious to the discomfort he caused in his left arm. Of course he knew why the supplies were late: the Elders disapproved of Rana and her overt disrespect for their authority, and this was how they chose to show it. They'd have never dared such a tactic while he was First Hunter, but many things had changed since the accident.

His home, for instance. Rana had moved easily and naturally into the void left in the household by her mother's death—preparing his meals, ministering to his arm while it regenerated, doing her best to keep his spirits up. But nothing she could do would fill the void in his spirit or allay his snease of loss or make him feel *complete* again. Only time would do that.

Time was a friend in that respect, and an enemy in others. Time, along with

lots of sun-soaking, food and rest, had replaced his left arm. But the time needed for convalescence had also preyed on his mind. The other hunters had seen to it that he was kept well stocked with provisions during the regenerative period; this was a tradition, but he'd chafed at being an invalid, dependent on the beneficence of others. He had always been a producer and the role of passive consumer did not sit well. He had been First Hunter before the accident. During his period of forced inactivity other hunters had vied for the vacant position. This was natural and he felt no resentment. However, by the time he was ready to go into the field again, his reputation had faded and there had not been opportunity yet to reassert his prominence. To date, no one in the enclave was generally recognized as First Hunter.

In ways he could see and in ways he could not, Rana had changed, too. She was now prone to long absences from home and to loud, pointed questions whenever she attended a plenum. For every point of the Law she had a "Why?" For every Revealed Truth she had a host of doubts. Rana had become a nettle in the collective breeches of the Elders.

And that could be dangerous.

"They're goading you," she said. "They want you to bring me into line and this is their way of telling you."

"They'd be falling all over each other trying to supply me with farm goods if I were First Hunter again."

She came over and hugged him. "You *are* First Hunter as far as I'm concerned, and you should be treated as such. You bring more meat into the

enclave than any two other hunters combined. It's only because of me that they've held back on restoring your title—they don't want a First Hunter who can't control his daughter."

Veneem ran the fingertips of his left hand lightly over the glossy green smoothness of Rana's scalp. He wanted to tell her that she was the center of his life right now, that although her flagrant disrespect for the Elders distressed him, he admired her fire. But he said nothing of his feelings. It was not his way to show affection, never had been, and he couldn't change now.

"I guess I'm lucky you're not a farmer," she said, "or I'd have been taken off a long time ago."

His voice was a low growl. "Then there'd have been some dead Elders a long time ago. The Elders are the voice of God in the world—I believe that and I revere them as such. But they'll never hurt you, Rana. At least not while I breathe." He pushed her gently to arm's length and, resting both hands on her shoulders, gazed at her face. "But why do you do it? Why do you provoke them so?"

"Because everything they tell us is a lie! Everything!" The utter contempt in her voice made him cringe.

"How can you say that with such certainty? The Elders are older and wiser than either of us. And when they make a pronouncement, it is the Revealed Truth of God."

Rana's white teeth chewed briefly on her lower lip. "Some other time, Father."

"Don't toy with them," he said with an expression that matched the grimness of his tone. "You can push them only

so far. If you should ever be deemed a threat to the order, even I won't be able to protect you."

The squeak of wheels and the cllop of hooves from down the path halted further discussion as they both went to the door. The supply wagon had arrived.

"See?" Rana said, holding the hangings aside. "They've sent it late enough to irk you, but not late enough to bring you after them."

Orth, who had been driving the supply wagon since Veneem was a child, pulled the pair of horses to a stop in front of the house, set the brake and slid from the seat—not as smoothly nor as quickly as he had of old, but still with an unmistakable sureness to his movements. He was swathed in furs and blankets to such an extent that he no longer looked quite human. Only his eyes showed through the wraps—quick, dark, darting pupils under heavy green lids ringed with the white lines of age.

"You're late, Orth," Veneem said in a low voice. He knew he couldn't blame the old driver, but neither could he hide the menace in his mood as he went out to meet him.

"I know," Orth's voice was muffled by the layers of cloth covering the lower half of his face. "The Elders wouldn't let me load up until a short while ago. You're the first stop."

Veneem glanced back at Rana and shrugged. Still clad only in the thin tunic, she came out to help unload the milk, eggs, cheese and flour.

"Did they give you any reason?" she asked, shivering in the breeze.

"Something about missing supplies. Somebody said it looked like a hairy

got into the supply shed last night."

Veneem was reaching for a large wheel of cheese when he heard the word "hairy." His head snapped toward Orth while the rest of his body remained in position.

"A hairy? Last night?"

"Just talk. I wouldn't give it a second—"

Veneem whipped his body around in one abrupt motion and strode toward the house. Rana trotted after him carrying a basket of eggs.

"Where are you going?"

"After that hairy."

"But you heard Orth: just talk. Probably an excuse to make the wagon late."

"Any other time I'd agree with you. But I saw this one just a short while ago." Passing through the doorway, he headed directly for the northwest corner of the room where he kept his crossbow.

Rana's eyes were wide as she followed him. "And you didn't go after it?"

"I didn't know it was a hairy then. I wasn't even sure I'd really seen anything. Now I know."

"But you can't leave now. It's past midday already!"

He made no reply as he pulled his doubly thick hunting cloak from a peg and threw it over his shoulders. His respirations were rapid and his skin tingled with exhilaration. A hairy! There hadn't been a confirmed sighting in years and the last kill had been longer ago than he cared to remember.

He had to bag this one! It meant reaffirmation of his status as First Hunter; no matter how displeased the Elders were with his daughter, they'd have to

publicly recognize his primacy if he brought in a hairy. He knew where to start the hunt—that gave him an edge—but he'd have to leave now if he was to have a chance. By morning the beast would be far from the region.

Rana waited for a reply. Receiving none, she hurried to her room and emerged with another crossbow.

"No, Rana," Veneem said in a matter-of-fact tone. "Not this time."

"*Especially* this time, father. I've never seen a live hairy and may never get another chance—there just aren't any left around here."

"No, Rana." His voice was louder and firmer.

"Yes!" she hissed with sudden, unexplained intensity. "I've handled a bow and followed the trails with you and mother since I was a child . . . I will *not* be left out of this!"

Veneem knew from her tone and her defiant posture that there was no point in arguing. She was showing her mother's side: when she made up her mind, that was that. He girded his cloak around him with the broad belt that held his supply of hunting bolts, hefted his bow and brushed past her on his way to the door.

"Get your horse then."

Outside, he helped Orth finish unloading the supplies as Rana hurried around to the lean-to behind the house. The supply wagon had been turned and was on its way down the path toward the road by the time she led her bridled horse around to the front.

Veneem was momentarily awed by her appearance. It had only been two years since her mother's death, yet in that short period she had grown from

an awkward adolescent girl into a woman. She stood there, her eyes shining in anticipation, wearing her mother's hunting cloak with her mother's cross-bow slung across her shoulder. His eyes were suddenly bleary with excess moisture and his breath did not flow as easily as it should. Shuddering, he pulled himself up on the horse's back. Maybe he didn't deserve to be First Hunter again . . . he seemed to be losing his iron. If he kept on this way, he's soon be a weepy, wilted old man before his time.

Expression set and teeth clenched, he gathered up the reins, gave the horse a harder than necessary kick on its flanks and raced off down the path. Rana hopped lightly onto her own mount and took chase.

They rode at full gallop west along the road toward the enclave center until Veneem pulled sharply to a halt and dismounted near a high thicket. Rana overrode the spot and walked her horse back to where her father was now pushing his way into the chaotic tangle of leafless branches. He became a vague shape, thrashing about and cursing as the smaller twigs, stiff with winter, poked at him from all sides. Finally . . .

"I knew it! Rana, bring the horses around!"

She led the animals back down the road until she found a break in the brush, then guided them through. Veneem awaited her in a clearing behind the thicket, a short distance from the road. He was pointing to the ground.

"Look—cloth-wrapped feet. Tracks everywhere. Cheese rinds, too. He was here. No doubt about it." Veneem followed the tracks a few paces into the

trees, then called back over his shoulder. "Tether the horses there. He's headed toward the big rocks."

Rana did as she was bid and hurried after him. The trail was easy to follow.

"Did it ever occur to you," she said, coming abreast and matching his stride with her long thin legs, "that a hairy may be more than just a dumb animal?" She watched him carefully as he replied.

"Never said the hairies were dumb. In fact, they're the craftiest of all animals, as well as the tastiest. That's why they're such a prize."

"But the way they wrap their feet and bodies against the cold . . . doesn't that indicate a high level of intelligence to you?"

"Just imitation. They watch us, they steal our food and materials and copy what we do. They're just game animals. It's Revealed Truth."

"Revealed by whom?"

"Are we going to have to go through that again? You're courting sacrilege—just like at the last plenum when you made everyone so uncomfortable with your impertinence."

"Who revealed the 'truth' that the hairies are animals?" she repeated in a dogged tone.

"Don't ask foolish questions." His voice took on the sing-song tone of a recitation: "God made us in his image and speaks through the Elders to guide us back to our place as the lords of creation. Revealed Truths are the word of God."

"God made us, did he?" A taunting smile seeped onto her face. "If that's so, then we're following the tracks of God."

This statement brought Veneem to an abrupt halt. Rana, too, stopped. They faced each other in silence, their breath steaming, streaming from nostrils and parted lips.

"What madness is this?" he said in a hoarse voice. "Why do you torment me with this blasphemy?"

"I don't mean to torment you, believe me. I just want you to know what I know. And now, while you're hunting a hairy . . . it seems to be the best time to tell you."

"Tell me what? That our most highly prized game animal is actually our Creator?" He started walking toward the rocks again. "I'm going to have Dr. Baken take a look at you tomorrow. Maybe he can come up with an elixir or something to—"

"Baken is my source of information!"

Once more Veneem stopped short. The answers to a number of niggling questions were suddenly quite clear. The doctor's inquiries about Rana this morning were also explained.

"Baken, eh? That's where you've been going when you disappear for a whole day." He snorted. "Who'd have thought? So he's the one who's been filling your head with this garbage. I'll have to have a little talk with Dr. Baken."

"He's a good man. We became friends while he was treating you and mother after the accident."

"He's a fool and worse if he's taught you to blaspheme!"

Veneem resumed his pursuit of the hairy but found it almost impossible to focus his attention on the trail. Dr. Baken had somehow corrupted Rana's

thinking. That in itself was bad. But there was more than a few ideas at stake here: the heretical views Rana now held could endanger her life. That was what concerned him most. If she should ever start spouting such madness at a plenum—and she was impulsive enough to do just that given the proper circumstance—the Elders would be duty bound to silence her.

Forever.

And that would mean his end, as well. For he'd never allow anything to happen to her while he could raise a hand in her defense. She was all he had left, really. There was no one he could truly call a close friend—Nola had been that and a wife, too. They had formed a self-sufficient unit, the two of them—a threesome after Rana arrived. There had never been any need for outsiders.

Now they were two; no matter how wrong she was, they would not be divided.

They arrived at the big rocks, a pile of huge stone shards that rose above the forest and stretched away into the haze of the south. Veneem searched along the base of the formation until he found the place where the tracks disappeared.

"He started to climb here." As he began to hoist himself up on the first rock in pursuit, Rana laid a gentle hand on his shoulder.

"Baken has books."

Veneem dropped back to the ground again but remained facing away from his daughter. Utter hopelessness began to settle upon him. Rana was getting in deeper and deeper. Hiding books from the Elders was punishable by death. He ground his teeth in frustration—he couldn't understand her; her constant

questioning, her poking into things she should leave alone. It was a good life under the Elders if you just tended to your business . . . his voice was barely audible when he spoke:

"Books are forbidden. They're to be turned over to the Elders as soon as they're found."

"That's so we won't find out what's inside them. Their authority would be destroyed if it became generally known that we're the descendants—worse, yet, the *creations*—of the hairies!"

"*Madness!*" He still refused to look at her.

"No! Baken's learned to read some of the books and he's teaching me. He's learned things. Incredible things. Things that go against everything we've ever been taught."

"I have no wish to hear them," he said as he found a foothold and began climbing the rocks.

Rana scrambled after him. "You're going to have to listen to me, Father. Baken told me of the time some hunters brought in the carcass of a pregnant bitch hairy. She'd been nearing her time when they got her and he was able to examine the unborn baby. He says it looked just like we do at birth!"

"Be quiet!" Veneem said angrily. He was climbing as quickly as he could, whether in pursuit of the hairy or to escape his daughter's blasphemies, he wasn't quite sure. "The beast will hear us coming!"

But Rana refused to be put off and kept pace. "Did you know that we're all born with pink skin and hair—hair on our heads and above our eyes? Sometimes fine hair on our arms and legs? And that our skin doesn't turn green

until we've been exposed to light? Nobody talks about that . . . the same way nobody admits that if you took a hairy, sheared his fuzz and stained him green, he's look as human as we do! It's obvious to anyone with eyes that we come from the same stock."

Veneem halted his climb and turned to face Rana. Leaning his back against a rock, he studied her a moment before speaking. His anger seemed to have dissipated and his tone was that of a patient parent speaking to a rather dull-witted child. He raised his forearms diagonally before him, right angles at the elbows, his palms on edge toward Rana. The tips of the right and left middle fingers touched lightly at eye level to form a point.

"This," he said, moving the right arm, "is the animal kingdom. This"—the left arm moved—"is the plant kingdom. At the apex are you and I and our kin: humanity, the highest form of life, the fusion of plant and animal. We have the best attributes of both kingdoms. In lean times we can take a certain amount of nourishment from the sun, and should we lose a limb we can grow a new one. No animal can do that. Yet we can move around and go where we wish, use our hands to build, and eat and drink in the winter months when the sun is weak. No plant can do that."

He sighed. "Don't you see? Not only does what you say go against Revealed Truth, but against common sense as well. The hairies belong solely to the animal kingdom. We are superior to them in every way. How could *they* have created *us*?"

"Baken says—"

“ ‘Baken says!’ ” he mimicked. “ ‘Baken says!’ I’m sick of hearing about what Dr. Baken says! I’m after a game animal now—it’s my job. If you cannot be silent, go wait by the horses!’ ”

Rana persisted. “Baken says that long ago the hairies took a cell from a—”

“Cell? What’s a cell?”

“As Baken explains it: it’s one of the uncountable little capsules, invisibly small, that make up the bodies of every living thing.”

It was Veneem’s turn to taunt. “Look at me! How many ‘cells’ do you see?”

“When you stand on a hill and look at the beach, how many grains of sand do you see?” She did not wait for an answer. “As I was saying, the hairies took a cell from a plant and removed its nucleus—that’s the thing in the center of the cell that controls it—and replaced it with the nucleus from a cell of a hairy. For a while it was just a curiosity, but then they learned how to grow an entire organism from one of these cells. And then we were born. The hairies are the real humans . . . we’re their creations.”

Veneem made a contemptuous, snorting noise. “And you mock me for blindly accepting the teaching of the Elders! Look what you’ve just said: you’ve told me of something called a ‘cell’ which you admit you’ve never seen—*can’t* see—and then about something else inside this ‘cell.’ Then you tell me that the beasts who have to steal food from us to survive the winter actually grew us from one of these mythical little capsules. Really, Rana! Who’s the fool?”

“We’re all fools for believing the

Elders for so long! We—”

Veneem’s right hand shot out and covered her mouth. A light shower of tiny sand particles had begun to fall, sliding and bouncing down from the rocks above, sprinkling their heads and shoulders.

“He’s up there!” he whispered. “And if he has ears he’s heard us.” Unslinging his bow, Veneem drew the gut string back to the last notch, set the trigger, and put one of his heaviest bolts in the groove. To his left was a break in the rocks, about a man-length or so wide. He sidled over and peered into it. Empty. A high-walled gully sloped upward for a short distance, then banked off to the right. With weapon at ready, he began his ascent.

The floor of the gully was smooth—it probably served as a water run-off during the spring—and there were patches of ice in scattered recesses. He heard a sudden loud crunch from up around the bend, then nothing. The sound was repeated, followed by a series of lesser noises, and then a large boulder bounded around the curve in the gorge and came rolling at him. Veneem gauged its path and ran upwards toward the bend, allowing the stone to bounce off the far wall and pass him on his left.

Reaching the curve, he saw it—a buck hairy. Tall, thin, full mane on head and face; his torso and lower legs were wrapped in tattered cloth and he had just kicked loose a second boulder. With no time to aim properly, Veneem chanced a quick shot from waist level. The hairy howled in pain and clutched its left thigh as Veneem leaped to avoid the oncoming stone juggernaut.

Too late. He misjudged its ungainly

Analog Science Fiction/Science Fact

wobbling roll and it struck him a glancing blow on the rib cage as it passed. Pain lanced up to his left shoulder and down along his flank as he fell on his back and began to slide down the gully head first. For a few heartbeats he could not draw a breath. Then, as his oxygen-starved mind was about to panic, air began to gush in and out of his lungs in ragged gusts. He hauled himself into a sitting position and waited for the pain to subside.

Rana had heard the wail of the wounded hairy and she now peered around the corner of the gully. Seeing her father leaning against the rocks with his hand pressed against his ribs, she dropped her bow and scurried up to his side.

"You all right?" Her expression was frantic.

Still gasping, Veneem nodded and pointed back the way they had come. "Help me up. I wounded him but he still might be dangerous."

Rana took his bow and his arm and led him back to safety. When they reached their previous position, Veneem sank to his knees.

"We'll let him bleed."

"Where'd you get him?"

"Leg."

Her eyes darted back and forth as her mind seemed to race. "Then we can take him alive!"

"Never!" Veneem was getting his wind back.

"We must! We may never get another chance like this to learn the truth about the hairies."

"I already *know* the truth!" He spat the words. "And it's part of the Law that all hairies must be hunted down and

killed like the wild game they are!"

Rana nearly leaped at her father. Her patience was as frayed as his and had been further thinned by seeing him injured. She blamed herself for that—if she hadn't talked so much, they might have been able to take the hairy by surprise instead of the other way around. But it was his unshakable orthodoxy . . .

"How many 'game animals' have set a trap for you, father? That's not just a wild beast up there!"

Veneem rose slowly, painfully to his feet. "No more of your fever dreams, please. I've more pressing matters to attend to. Silence, now!"

"No! I want you to think about what I've said before you kill it."

"I *am* thinking and I've *been* thinking. *You* must think! If the hairies had the power and the intelligence to create us, what happened to them? Where is their mighty civilization? Answer me that!"

"Baken says"—Veneem growled at the name—"that in their toying with the stuff of life they somehow altered one of the things that make us sick and a great plague swept the world. A famine followed. After that, those who didn't get sick or starve to death went mad, killing each other and destroying their cities. We survived. The plague had no effect on us and we could augment our nourishment by sun-soaking. We multiplied while they died.

"Only a few hairies are left. They hide in the ruined cities. That's why we're forbidden to go there—because we'd find out that the 'Truths' of the Elders are lies and their hold would be broken!"

"Very clever," Veneem said with a

slow, sad shake of his head. "Dr. Baken has managed to twist everything. Everyone knows, and Revealed Truth confirms, that we built the cities ages ago. They are now forbidden because they were the cause of our fall from grace. When we built them we separated ourselves from the land and the sun. For that we were punished—the cities were destroyed by God and we were banished from them forever."

He rubbed his injured ribs gingerly, then snatched his bow from Rana.

"No more talk! I'm going to find another way up there, and when I get to him I'll finish him."

Rana watched him briefly as he began to reload the weapon, then wheeled and ran to the edge of the gully where she had dropped her own bow. After checking to see that the bolt was still in place, she called over her shoulder in a low voice:

"I'm going up this way. If I have to hit him in the other leg to bring him down, I will. But I'm going to take him alive."

Veneem's voice was strained as he jolted forward. "Stay out of there—he's still dangerous!"

Rana ignored him and entered the gully. He finished loading as quickly as he could and went after her. He watched as she moved swiftly, cautiously up the center of the gorge. She was almost to the bend when Veneem saw the stone. It was smaller than its predecessors—about the size of a human head—and had been thrown rather than rolled. It bounced once on the granite floor, then flew straight for Rana. She made to dive out of its way but slipped on an icy patch and fell

against the far wall.

The bones of her right foot must have made a sickening noise as they were crushed, but it was lost in the loud crack of one rock striking another with shattering force.

Rana writhed on her side, her face contorted in agony. Low guttural sounds, half moan, half grunt, escaped between her clenched teeth as she tried to move the stone off her foot.

After a shocked, frozen instant, Veneem broke into a run and passed Rana without a second look. He had to reach the hairy before the next rock came. Rounding the bend, he saw the beast. It was desperately trying to dislodge a larger stone, one that would surely finish Rana if it started to roll. But it was wounded—its left leg was covered with fresh blood—and its strength wasn't up to the task. When it saw the green fury that was Veneem charging up the gully, it began to retreat.

The hairy clawed and scrambled along the ledge, its wounded leg dragging like an anchor. There was something almost like human fear in its eyes as it glanced over its shoulder at him, something almost human about the gibberish that burst from its mouth, something almost human in the way it rolled on its back and frantically waved its hands as Veneem stood within arm's length and aimed his crossbow at its head.

But it died like any other animal when the bolt split its skull.

"I think you're going to lose it," Veneem said as he gave Rana's foot a final inspection. It was swollen, misshapen, the skin had split in three places

and there were numerous spots of brownish discoloration.

A fire was blazing in the hearth, dancing light off the smooth green of Rana's skin as she sat before it. Her wounded foot rested on a folded blanket which in turn rested on a short stool. The bleeding had stopped; so had the pain. Most of it.

"You'll have to get Baken in the morning," she said.

"I'll not have that man near you."

"He's the only doctor in the enclave! If the foot must come off, he'll know where to cut. I won't let anyone else touch me!"

Knowing she was right but refusing to admit it, Veneem said nothing. He turned to the hearth and rotated the spit. He was tired. It had been no easy task to carry Rana to the horses, then fetch the dead hairy, then guide all home. He was feeling his age, especially in his ribs and his left shoulder—there was blood on the dressing over this morning's incision but he hadn't got around to changing it yet.

But at least everything was in its place now. Rana was warming herself by the fire, the carcass of the hairy was dressed and hanging in the cold shed while Veneem roasted a piece of it on the spit. He had cut off the right shank as a celebratory feast of sorts; the rest would go to the central supply shed in the morning. A glance at Rana's wound and he realized there was probably something symbolic in the cut of meat he chose.

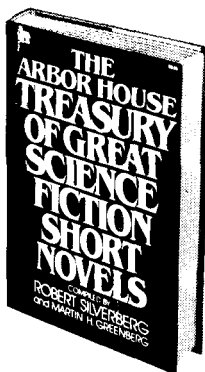
Everything was in its place—why, then, were his feelings in such a chaotic state?

(. . . those eyes . . . he kept seeing

Green Winter

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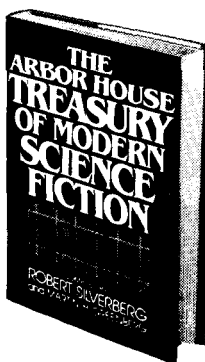


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ARBOR HOUSE

those eyes . . . he'd never looked a hairy in the eyes before . . . not while it was alive and near and afraid . . .)

He shook himself irritably and sliced a few small pieces off the shank. Dropping them into a wooden bowl, he then reached over to place them in his daughter's lap.

Rana fended him off. "Get that away from me!"

She was physically and emotionally spent and Veneem did his best to be solicitous.

"Better eat it. You'll need all the nourishment you can get when regeneration starts, especially since there's no sunlight worth mentioning this time of year."

"I'm no cannibal." Her words were clipped and sharp.

"Don't be foolish—you must be starved. I know I am."

Rana eyed the fire in sulky concentration. "You didn't have to kill it."

"Yes, I did. And for more than one reason." He squatted before her with the bowl in his lap. "First of all, it hurt you. Nothing can hurt you and be allowed to live. Second, if we had brought it back alive as you wished—and I'm not really sure we could have—you'd have begun publicly pouting the madness that Baken's put into your head. And that would mean the end of you.

The Elders would have no choice then but to order your death. Third, because this catch makes me First Hunter beyond any doubt. And last . . ." He paused.

(. . . those eyes . . . that gibberish . . . almost like words . . .)

"And last"—he was forcing himself to speak steadily—"I killed the hairy because it's the Law that all hairies are to be killed. They're very scarce now and we may never see one again. But if I should come upon another, I'll . . . I'll kill it. And that settles the matter."

Rana had slowly turned her gaze from the fire to her father as he spoke. She sensed something, something no one else could have detected. A slow smile spread across her face.

"You're bluffing! I thought I heard it in your voice and now I see it in your face: you're not so absolutely sure of yourself anymore, are you?"

"Of course I am!"

"Then go ahead!" She pointed to the bowl on his lap. "Roast hairy was always your favorite—eat your fill!"

Veneem picked up a slice of meat. It was hot and firm with a thin coating of grease that oozed onto his fingers.

(. . . those eyes . . .)

He dropped it back into the bowl.

"I'm not hungry." ■

● Science has always promised two things not necessarily related—an increase first in our powers, second in our happiness or wisdom, and we have come to realize that it is the first and less important of the two promises which it has kept most abundantly.

JOSEPH WOOD KRUTCH

The Alternate View THE MOST VALUABLE BOOKS IN THE WORLD

by G. Harry Stine

Let's pretend—which is a perfectly adult-type game we engage in when reading or writing science fiction.

Let's pretend that (a) you're about to embark upon an interstellar flight from which there's no return; you're strictly limited in the amount of mass and volume you can take along; and once you've left, there's no way you'll be able to communicate with Earth again for five generations.

Or that (b) somebody's said the magic words on the red telephone, the buttons have been pushed, the balloon's gone up, you've got a deep hole, but you're limited on what you can save because of time and available storage space in your hole.

Question: What do you take with you?

Answer: Information.

Question: In what form?

Answer: Books.

Not video tapes or computer records; they require special equipment and electric power to operate.

No, take books printed on the most durable paper you can find and with the finest binding you can obtain. Books require no special technical equipment to use.

Which books?

Remember: You're limited in weight and volume. You can't take the Library of Congress or the New York Public Library.

Let's make the game tough as well as interesting by permitting the selection of six (6) books.

Select *any* six books you want. No more. Less if you wish. But no more than six books. Period. Other than what you remember in your somewhat-fragile memory, those six books are going to contain all the information you have available with which to survive on a new planet and build a planetary culture or to re-build an old one on the planet your buddies have just creamed with a bunch of ten-megaton toys. Not *everybody* will die. As Willy Ley once said when discussing the matter, "There will always be survivors."

When you reach your interstellar destination or when the local radioactivity drops to a livable level allowing you to come out and rebuild the world, what six books would be the most valuable to you?

Bob Heinlein pulled this one on me thirty years ago. It was a dirty trick. I've been thinking about it ever since. It's taken up a lot of valuable time that I could have spent being lazy. It's a nasty little problem that nags at one day and night. It makes enemies or staunch friends during discussions on the whichness of what. And one cannot come to a firm decision. I've revised my own list as the years have gone by.

Tops on my list for thirty years, however, have been the following:

The Handbook of Chemistry and Physics, current edition, published by the Chemical Rubber Publishing Company, Cleveland OH.

Mechanical Engineers' Handbook, current edition, often known as Mark's Manual, published by McGraw-Hill.

Reason: These two volumes contain gobs of data. Log tables. Formulae. Solubility products. Steam tables. Page after page of numbers. The life works of thousands of researchers. The accumulated empirical data of generations of engineers.

An individual, no matter how well-educated and brilliant, simply couldn't duplicate the contents of either book, let alone both, in a single life time.

But with these two books, you could build a civilization on a pre-existing foundation of technology and probably do it in less than a life time.

The other four books have changed from time to time as my world view changed. I won't bother you with the books I've discarded from my list: they might make some people unhappy. Never mind. I've tried to keep in mind that the books must contain the data I'd need to get things started again either on some far distant planet or on the remains of this one.

The four other books currently completing my list are:

The Merck Manual of Diagnosis and Therapy, edited by Dr. Robert Berkow, M.D., published by Merck, Sharpe & Dohme Research Laboratories, Rahway NJ. Current edition is Number Thirteen.

Mellor's Modern Inorganic Chemistry, revised and edited by G.D.Parkes, published by Longman's, Green and Co., New York. Last edition I was able

to get my hands on was 1952.

The Way Things Work, An Illustrated Encyclopedia of Technology, Volumes One and Two, Simon and Schuster, New York, 1967 and 1971.

I think we could hack it with those six books, total mass 16 pounds, total volume 910 cubic inches.

Sorry, no books of great art. None of the Great Books of Literature. None of the great religious books of the world. No texts on psychology, sociology, economics, or biology.

If I haven't got you riled-up by now, why not?

Are we that much in agreement?

If we are, *what the hell are we doing trying to repair the damage of today without using those books?* Why are we trying to rebuild a world by appealing to emotions, luck, mob hysteria, and other sorts of irrationality? Or why are we *permitting* the world to be demolished by these factors?

Now, have I got you riled-up?

We started out playing "let's pretend." Turns out we weren't after all.

We *are* trying to survive on a strange planet without help from anybody else. UFO's notwithstanding, nothing's descended from the skies in my part of the planet recently and handed us new technology from on high that will solve any problems. We're having to work it out ourselves the hard way by trial and error, by hypothesizing followed by experimentation, and by diddling and fiddling with it until we make it work in spite of everything.

We *are* trying to re-build a planet and a way of life after the balloon's gone up. The balloon's been going up for 3166 years of the 3435 years of recorded

Analog Science Fiction/Science Fact

history. Anything that's taken up 92.2% of our history is a constant of our lives, occupying more time than sleeping, eating, playing, working, or fornicating. When we haven't been tearing up this planet wasting each other, we've been tearing up the planet for raw materials and natural energy, far too much of which have gone into war. We're in the process of trying to re-build a planet to the condition that our ancestors enjoyed 10,000 years ago during the Late Pleistocene, an environment to which our physical and psychological needs are attuned.

The six books on my list tell us how to survive and/or how to re-build what we've lost. I don't know of any other books or collections of data that tell us how to survive on a terrestrial-type planet occupied by perhaps three billion people, most of whom cannot read or write their native language and most of whom are starving or, at best, suffer from malnutrition.

As I write this, the Iranians—once a proud race and the fountainhead of technology in the Eastern or Oriental world at least twice in the annals of history—are in the process of learning this the hard way. They've thrown out the Western Devil: a technology that was hated because the leaders couldn't understand it. (In the Christian world, the Society of Jesus learned they couldn't let that happen many centuries ago.) The Chinese just went through a great cultural revolution and they learned the little red book wasn't very nutritious and a poor substitute for a good meal,

which required technology to achieve when there were more mouths to feed than the land could *naturally* support.

Eric Hoffer made an astute observation that I've personally confirmed: One can determine the state of affairs in a country or a culture by how well the plumbing works.

This isn't a question of arguing realities. A toilet works or it doesn't. The water's safe to drink or it kills you with typhoid, typhus, or other salmonella or shigella organisms. No amount of mystical chanting will make that toilet work or kill the germs in that water supply. A pair of pliers or a shot of chlorine used according to instructions appearing in the six books *will*. The reality is ultimate and pragmatic: it works or it doesn't. You live or you die. Some maintain that this existence isn't reality and that we each make our own reality. (The Solopisist Society will convene in solemn conclave tonight at eight o'clock, provided I don't take an aspirin and cause everyone else to go away.) Sorry. I've got just this one reality that I know I can make work for me by using those six books. I don't know about those other realities that require I give up what I know works for something that may or may not be there after all . . . and no way to get back if it isn't.

The arguing about realities isn't the question here. The question is: How do we survive on a hostile planet? Or how do we re-build a culture or a civilization decimated by war?

What are *your* six books? ■

Science is built of facts the way a house is built of bricks; but an accumulation of facts is no more science than a pile of bricks is a house.

HENRI POINCARÉ



Robert
Shore

Charles V. De Vet

EXPENDABLE

Disposable tools are sometimes a minor convenience,
sometimes a wasteful luxury—
and sometimes the only way to get a job done.

“Tis in ourselves that we are thus and thus. Our bodies are our gardens, to which our wills are gardeners.”

The cablegram from Earth’s consul on the planet Calixco read, **EARLY RETIREMENT REQUESTED**. Which was code for “Information high priority situation. Personal transmission suggested.”

Earth ordered the consul’s immediate return—without response. Other urgent cables also went unanswered. Which put the affair into the hands of Earth’s Security Bureau. Their decision was to send George Quirk, top secret “mas-ker” and trouble-shooter.

Security Superintendent James Dag-non put in a call to the Human Resources Bank.

The body lay immersed in a tank of clear jell, like an army rifle, stored for future use. Its life functions were slowed to 6% normal while its mind functioned not at all.

Doctor Earl White, bioengineer, consulted a controls board on a near wall and pressed a button, raising the temperature of the tank one hundred twenty

degrees. In thirty-eight minutes, the jell became a liquid, and slowly drained away.

White connected a stimulator to the body, just above the heart, and pressed a second button. The body jerked half erect, then eased slowly back onto its plastic cushion. The Doctor removed a breathing tube from its mouth, and began massaging the body briskly. Abruptly the eyes opened.

George Quirk looked up at the white-coated man leaning over him. The man was speaking, in a barely audible voice. “My name is Doctor Earl White.” Quirk could make out, dimly. “How are you feeling?”

Quirk tried to speak, but his tongue was awkward from long disuse, and only a garbled sound came from his throat.

“Try swallowing a few times,” White suggested.

Quirk obeyed, and his face twisted in a grimace. “Something tastes bitter as hell,” he complained, finding that he now had no difficulty in speaking.

“Some of the preserving fluid must have gotten into your mouth,” White

said. "It's non-toxic," he reassured. "Can you sit up?"

Quirk raised himself to a sitting position. "Apparently I can."

"Exercise your arms and legs, and bend your back a few times," White advised. "When you feel ready, let me know, and I'll help you out of the tank."

Quirk did the suggested exercises, had to lie back once when he grew dizzy, and with the doctor's assistance climbed from the tank.

Under White's supervision he walked about the room for perhaps ten minutes. "I should be able to make it now," he said, "I suppose Dagnon's waiting for me?"

White nodded. "It's a rush job, I believe."

"It always is."

"You seem in pretty good shape," the Doctor said. He indicated a chair in the rear of the room with a motion of his head. "Your clothes are over there. They should fit."

As Quirk dressed, White said, "I'd advise you to walk to his office and back. You need the exercise, and it should show up any weaknesses."

Quirk strolled leisurely across the skywalk connecting the Human Resources Bank with the Security Bureau building, went down a long corridor, past a row of elevators, and up a walkway at the far end. As he moved he could feel the knots and stresses leaving his muscles, and his body joints becoming more pliable. On the seventh floor he opened a door lettered simply, JAMES DAGNON, and went in.

The smartly dressed, handsome man

reading a star map on one wall turned as Quirk entered, and smiled. "I appreciate your getting here so quickly, George," he said, his manner cordial. Quirk noted, however, that he did not offer to shake hands. Quirk had experienced that reaction before.

"Sit down, please," Dagnon invited, indicating one of a row of chairs beneath the man he had been studying. He took the chair next to Quirk.

"You look different," Dagnon said, in an apparent attempt at humor. "Last time I'd have taken you for a bookkeeper, now you might be a crack athlete." When Quirk returned neither the conviviality nor humor Dagnon asked, "How's the bod?"

"Still a bit stiff," Quirk answered. "I walked over here and up the ramps testing it, and all I found was a sore spot in the middle of my back, and one knee that didn't operate as well as it should. That's about it."

"The Doc will check you over just as soon as you're through here," Dagnon said. "I'm sure he won't find anything basically wrong. I hope not, because we'd like you to go out tonight."

Quirk bowed his head briefly.

When it became apparent that Quirk had nothing to contribute, Dagnon said, "I presume you understand what you're supposed to do?"

"Find the consul—and bring him out," Quirk said.

"If he's still alive, of course," Dagnon amended. "We think he is. They'd hesitate before doing anything as drastic as killing him. However, if conditions get worse that hesitation might vanish quickly. Which means our time is lim-

ited, and that's why we're in a hurry to get you out there." He paused. "We have every confidence that you can handle the job, George."

"What kind of trouble are you having with them?" Quirk ignored the compliment.

"Nothing concrete—until now," Dagnon answered. "Calixco is one of the newer Human Worlds, located in the Crow Wing nebula. It was settled by Broznia, one of our own first colonies, and is still under her domination. Earth and her allies have been in a protracted trade struggle with the Broznia group that could easily blossom into a full-scale war. We have reason to believe that Podratz—that's the consul's name, if you recall—picked up important data concerning the controversy."

"That's it then?" Quirk had the impatience of a man little interested in small talk.

"Right." Both men rose, and Dagnon's right hand reached toward an automatic motion of hand shaking, and stopped awkwardly. "Good luck," he substituted. Quirk allowed himself a lip smile as he left the room.

In the Human Resources Bank building Doctor White completed Quirk's physical. "You're in good condition," he said. "The pain in your back was just a muscle kink, and will be fine. Your left knee has had a cartilage removed at one time or another—and that causes the weakness you noticed. I'm going to seal it with a permanent new-skin bandage that will make the leg ninety-seven percent operative. You'll never notice the loss, unless you twist the knee badly."

Expendable

Quirk was happy when the examination was over. The knowledge that millions of human parts, and even whole bodies, similar to his own, were stored in the building always gave him a feeling of unease. The parts and bodies came from executed criminals. In an age of high density population, serious crime could not be tolerated, and those apprehended and found guilty paid their debt to society by involuntarily contributing their bodies. Quirk did not question the process, but his instincts pushed against being too near the repository.

He went directly from the Doctor's office to the spacebridge launching site, strapped himself into his "ram", pressed a button—and awoke on Calixco. The ship had been programmed to arrive shortly before dawn and find a resting place on the bottom of a lagoon bordering Calixco's spaceport.

Quirk allowed his body one last oil massage, and afterward donned a plastic water suit and let himself out. He floated to the surface in nearly complete darkness, which gave him the concealment he needed, but made his task of secreting the suit more difficult. With a considerable amount of groping he succeeded in burying it in soft earth at the edge of the beach, and marked the place with several dead tree branches.

All of Quirk's attention as he left the lagoon and headed toward a group of white buildings ahead was on his new environment. As always during the first hours on a strange world he found himself caught up in the special aura of the place, the wash of subtle alien stimulation, the promise of adventure and in-

trigue. Nothing on Earth could compare with it.

Now a spray of wave-tossed mist blowing in from the sea moistened his cheeks, and his nostrils tested the acrid scent of an alien vegetation drifting down from a high bluff overhanging the far side of the spaceport.

His five standard senses, and others less apparent, searched out the new environment, ingesting the mystery and fascination of it, the lure—and the mild inner uncertainty at how well he would conduct himself here.

Quirk's primary need at the moment was a place to stay. There was only one hostelry in the spaceport territory, he learned when he reached there, the Trailways Motel, built of adobe, as were all the other buildings, but a bit more elaborate. Signs in the crowded lobby of the motel proclaimed the fiftieth anniversary celebration of the founding of Calixco.

Quirk worked his way to the registration desk, observing a tall clerk in the act of turning away an applicant for a room. As he had feared, the place was filled.

He took up a position at the near end of the desk, with only a vague notion of what he would do, and waited there until the clerk saw him, and shook his head. Quirk transferred a hundred-credit note (authentic Calixco currency) from his money pocket to the lacquered desk top. "I'll bet this hundred you can't find a room for me," he said.

The clerk regarded the money pensively before shaking his head. "We're filled," he said, with genuine regret. "Really filled." His gaze shifted to Quirk's face, and he weighed him with

a brief appraisal. "However, if mer-shheen would care to share my room—" He added, "I will be using it only from the hours of twelve to eighteen, when it will be necessary that I sleep. If that would be convenient—"

"I'm sure it will do nicely." Quirk pushed the hundred-credit note forward. "I'll make a point to be out when you need it."

The clerk took a key from a side pocket and laid it on the counter, picking up the money with the return movement of his hand. "It's the small room just off the mezzanine, but you'll have little trouble locating it."

"Thanks for accomodating me." That much taken care of Quirk could proceed to less immediate but more urgent matters.

"Oh—" The clerk had a sudden remembrance. "If you will wait a minute, please." He grinned conspiratorily at Quirk and pulled a speaking tube from beneath the desk top. He let it ring three times and spoke into the mouthpiece. "Sorry to wake you, Hon, but I had a chance to rent the room. Yes, I know. I'm not sure. Tomorrow maybe." He replaced the tube softly. "If you will wait perhaps fifteen minutes?" he asked Quirk.

"No trouble." Quirk turned away and after a minute of indecision strolled out onto a rear port, that faced the inland sea and an orange-yellow sun just rising above the horizon. Ras Algethi, it was named on Earth charts. Its rays gave everything a pale orange hue, distorted slightly by a mist rising from the blue sea.

A muted hollow sound came in with each wave as it struck the shore, and

a mild odor of sewage irritated the nostrils. Calixco had not yet completely solved its sanitation and disposal complexities. The problem was typical of a newly settled world—where the population usually grew faster than the organization necessary to supervise it.

Twenty minutes later Quirk returned to the lobby. There was no moving ramp, he saw—the building was only three stories high—and he walked the short flight of stairs to the mezzanine. He located the clerk's room and was about to put his key into the lock when the door opened and an auburn-haired, green-eyed girl in her early twenties came out. She had a pretty face and a quite good figure, but she carried it a bit too carelessly. On one arm hung an overnight bag, the universal trademark of her profession. She was probably not a streetwalker, but was definitely one of Saki's "specialists in romance at short notice."

"Are you the man who rented this room?" she asked.

"That's right," Quirk answered.

"I'll leave the door unlocked then?"

"Please." As they spoke Quirk made a quick appraisal, which in his profession was so much an habitual procedure. He noted the curl decorating the girl's forehead, and the slit corners of her eyes, that gave them a piquant, oriental slant. A local custom? Or a mark of her profession?

She stood for a moment fingering a fine silver chain about her neck, her eyebrows raised in question. As occasionally observed in her profession, she was fresh and clean featured, and Quirk found himself regretting his lack of time

for diversion. He shook his head in answer to her unspoken question.

She accepted the rejection without rancor. "Sleep tight," she jested, and walked to the mezzanine stairway, turning and smiling at him over one shoulder as she descended.

Quirk went into his room and gave it a quick inspection. A single and a double bed, two straight chairs, a lounge chair, and a chest of drawers between the two beds. Nothing elaborate, but adequate. Larger than most Earth hostelry rooms.

An adjoining doorway led to the bath. Quirk went in, used the lavatory, and washed his hands and face—and he was ready to begin work.

At a directory in the lobby Quirk looked up two addresses, one that of the Earth consulate, and walked one block up the street and entered a low brown-front building. In the inside office a man seated at a low desk slept with his head in his arms. Quirk coughed. The sleeper roused and raised his head, revealing the face of a man in his early sixties, with pepper-gray hair and a pepper-gray mustache. "You looking for somebody?" he asked, with red-eyed ill humor.

"For the Earth consul," Quirk answered.

"Our eminent consul, Mr. Norman R. Podratz," the man managed to be expansive and curt in the same words, "has taken a walk."

"Do you know where he went?" Quirk asked, ignoring the other's lack of civility.

"You tell me." He seemed to read something in Quirk's expression then,

and said, "I'm sorry, I—" and paused to consider. "Can I get you a drink?" he asked.

The best way to get the information he needed might be to humor the fellow, Quirk decided. "I could use one," he accepted.

Miles Montgomery, subconsul—the sign on the desk read—rose and walked carefully to a vision-master console in one corner of the office. He opened its double doors, revealing an inside from which the works had been removed and three shelves substituted. Two bottles rested on the top shelf. Montgomery turned to Quirk. "A kind of native gin, and sour mix, is all I've got," he said.

"They'll do fine," Quirk answered.

The subconsul mixed a highball and brought it over to Quirk. He had not prepared one for himself.

Quirk continued to study the man, noting the difficulty he had in keeping his eyes focused, and decided that Montgomery hadn't been drinking, but was using a drug of some kind. The fact that he was stuck here in this minor post, at his age, meant that he had gone as far as he was going to go in the diplomatic service, knew it, and was using drugs to make his retirement wait more palatable. Quirk decided he might have difficulty getting any useful information.

"What can I do for you, sir?" Montgomery asked, assuming an officious pose.

"My name is George Quirk. You should have been expecting me."

Montgomery chewed on that a moment before glancing at a loose pile of correspondence on one edge of his desk, most of it unopened. "Everybody's al-

ways gotta be so damned mysterious," he complained. "You a VIP?"

"No, but my job is. I'm from Earth's Security Bureau, and I'm here to find out what happened to Mr. Podratz, and why our latest communications haven't been answered."

Montgomery hung his head like a small boy caught in mischief. "I've been kind of sick," he apologized.

Quirk accepted the obviously inadequate excuse. "Do you have any idea what might have happened to Mr. Podratz?" he tried again.

"None whatever," Montgomery answered, apparently truthfully. "About a week ago he said goodnight and left the office, like he always did, and that was the last I saw of him."

Quirk restrained a sigh. "Can you give me some background on the political set-up here?" he asked. He needed whatever he could get.

"A very loose kind of oligarchical government," Montgomery answered Quirk's question. "The place hasn't really settled down yet, and the officials run it like a South American army camp. They've got a lot of problems, and they're not handling them too well. Besides, this's a dirt-poor World. They've got big deposits of metals in the hills and some precious stones, but right now the smugglers are getting most of 'em."

"Can you make arrangements for me to talk to some official high enough up to know what's going on?" Quirk asked.

"I wouldn't try it, if I were you," Montgomery cautioned. "They're a mean bunch, and Earth's just about at the bottom of their S list. If you as much

as let 'em know why you're here, you could end up with your neck twisted into a knot."

Which might be good advice, Quirk acknowledged to himself. He noticed then that Montgomery's eyes were beginning to lose their focus again, and a moment later his head bobbed, quite noticeably. Quirk decided that he wouldn't be able to get much more here. When Montgomery's head went down on his arms he took a last swallow of his highball and left.

Quirk's next destination was the second address he had checked on back at the motel. He found it in the old section of town, a slab-sided building, just a shade above a shack. The address of a Kreek.

Almost every world had its Kreek, one of the three nonhuman races encountered by Earth's humans spreading out through their spiral arm of the galaxy.

The Kreeks were famed for their guile and ingenuity, and ability to supply information—for the right price. Their home planet had an eccentric orbit about its sun, with temperatures ranging from one hundred fifty degrees Fahrenheit to several hundred below zero. (During the latter period they hibernated.) A race that had originated, and survived, on such an inhospitable world had to be ingenious and swiftly adaptable. Humans regarded them as cunning and treacherous—though quite trustworthy if paid enough to insure their loyalty.

Quirk stood for a minute in the windowless room, letting his eyes adjust to the dim light coming from a luminous

crystal over a desk-table directly ahead.

Behind the table something moved. A round, snake-long body, with the face, arms and legs of a man, partly sat and partly lay in a toboggan-shaped chair. Its blood red eyes regarded Quirk balefully.

Quirk wasted no time studying the alien. He had done business with his kind before. "I need to find a man," he informed the Kreek.

"With me that is my business," the Kreek replied. He spoke quite passable Earthian, except for a slight "x" slurring caused by his polypoid tongue and double rows of saw teeth. His face was much like that of a human, though the hair was too coarse, and the ears mere bundles of cartilage. The lower two-thirds of the face had a painted-on whiteness.

"I want to find the Earth consul," Quirk said. "His name is Norman Podratz."

The Kreek's baleful gaze stayed on Quirk's face.

"Oh—" Quirk pulled a thousand-credit note from his money pocket and set it on the table.

The Kreek might not have seen the money. "Mersheen Podratz has been apprehended to the Calixco police," he said.

Which was as Quirk had surmised. "Where are they holding him?" he asked.

The alien was silent for a time, and Quirk guessed that he was about to ask for more money, but was surprised when he made a facial motion that might have meant anything, and said, "He is with tight guarding in a prison cell in the exact building where the police have

quartered their offices.”

Quirk considered that. “Can you help me get him out?” he asked the Kreek.

“No, with regretfuls. That is without pertinent possibility.”

Quark pondered for another minute. “Can you get me in?” he asked. “And out again?”

The Kreek had his own minute of hesitation. “With moderate possibility,” he decided finally. “However . . . There will be a necessity of expenses . . .” He let the statement hang suggestively.

This was not the time to be niggardly. Quirk needed the Kreek’s best efforts—and complete cooperation. He took out five thousand credits and added them to the thousand already on the table. “There’ll be five thousand more if you get the job done quickly,” he promised.

The Kreek picked up the money, daintily unhinged his lower jaw, and dropped the bundle inside. Quirk’s astonishment at the performance was tempered by his recollection that a section of the alien’s compartmented stomach was used for storage. Juices would form a waxy coating about anything swallowed and preserve it indefinitely. “Your request can be accomplished with the quickest alacrity of four hours, promptly,” the Kreek said.

Quirk left the alien, and decided to return to his motel for a nap while he waited. He stopped off on the way at a confectionery shop and was fortunate enough to find a box of imported Hershey chocolate bars. The price was five times what they cost on Earth, but well worth it to him.

Back in his room Quirk had already removed part of his clothing when some vague unease localized on the night stand between the beds. One of the drawers was not completely closed.

He took a chocolate bar from its box, unwrapped it, and bit off a generous chunk. Chewing thoughtfully he walked about the room and spied other small signs indicating that the place had been thoroughly searched while he’d been out.

He finished his chocolate bar, unwrapped a second, and sat in the room’s easy chair to eat it while he considered. Nothing had been taken, which led to the obvious conclusion that the search had not been conducted by a thief. Probably the planet’s police, Quirk guessed. Did that mean they were already suspicious of him, or was it a normal procedure with visitors? He shrugged, shed the remainder of his clothes, and crawled into the double bed. It was faintly scented with woman aroma.

Less than an hour later Quirk came wide awake. Someone was putting a key into his door lock. He waited until the intruder eased into the room, and snapped on his bed light.

The girl he had met earlier stood in the doorway. “Oh, I’m sorry,” she apologized. “I didn’t know you’d gotten back yet.” She pointed to a shank of hair hanging from the foot of the single bed. “I forgot my hair switch,” she said.

“Help yourself,” Quirk offered.

“Thank you.” She went over, folded the hair into a ball, and stuffed it into her overnight bag. She started for the door, then paused. “I wonder—” she

began. "Would you care to—"

For a moment Quirk debated whether or not he should allow himself the diversion.

"You won't be sorry," the girl said, pretending to take Quirk's silence for consent, and began removing her blouse. Undressed she revealed pink and white flesh untinted by any rays of the sun, and her body was cool and sweet as she lay beside Quirk.

Quirk and the girl—Marthaleen, she had said her name was—lay for several long minutes without speaking, imbued with the warm content that follows satisfying lovemaking.

The quiet was broken only by the hollow thrumming of waves breaking against the seawall outside their bedroom. "Calixco City rests on a kind of honeycombed coral," the girl answered his unspoken question. "The sound comes from the waves beating against the hollows and cavities in the coral."

"I see."

They lay for a few minutes more before the girl said, "I can tell by your accent that you're from Earth."

"Right."

"What brings you to Calixco?"

The question confirmed a suspicion that had been building up since the girl returned. Quirk turned to face her. "Did the police send you here?" he asked.

Her eyes widened. "No," she said. "I came back because I hoped you'd changed your mind."

The pupils of her eyes had contracted as she spoke, which meant that she had been lying. "I'll pay you double what they paid you," Quirk offered.

"They didn't pay me nothing. When

the police give an order—" She recognized her blunder, and rose quickly. "I got to go," she said, and began putting on her clothes.

Quirk climbed from the bed, and gave her a hundred-credit note. He made no attempt to question her further.

The girl eyed the money for a moment, finished dressing, and came over to where Quirk stood. "I like you," she said, looking up. "I really do. So I want to warn you that you're in danger."

"Did the police tell you that?" Quirk questioned.

"They didn't tell me anything." She picked up her overnight bag, stood for a moment, undecided, "I heard Commissioner Royer talking to one of his men," she said then. "To them I'm just one of those people who don't matter much, and they didn't bother about whether I was listening or not." She stood on tiptoe and kissed Quirk briefly, and was gone.

Quirk reviewed the latest developments as he showered and shaved, and later went down to the motel restaurant and ate a meal of some indiscriminate variety of soup, a starchy vegetable that resembled a turnip, and meat off a thick bone.

He finished quickly and went out into the street—to find that a parade, probably celebrating Calixco's anniversary, was going past. A green-shirted tourist bumped him, mumbled, "Excuse me," and disappeared into the crowd. Quirk drew back into a bookstore entranceway and let the revelers stream by.

He heard someone call his name and saw the subconsul, Miles Montgomery, struggling through the crowd, trying to

reach him. He held out a hand and Montgomery grabbed it and pulled himself up beside Quirk.

"Good job," the subconsul complimented. "I was trying to get to your motel to talk to you."

Quirk noticed a swelling on the left side of Montgomery's jaw, and a bruise on one temple. The man evidently had been beaten. "Yes?" he inquired.

"The police are looking for you," Montgomery said. "You'd better get out of here while you still can."

"How did they learn about me?" Quirk asked.

"My guess is that they have my office bugged," Montgomery was speaking rapidly, looking nervously about him all the while. "They came in a little after you left, and went through my mail. They probably know all about you by now."

They wouldn't learn much just by reading the mail, Quirk decided. Probably the reason why the police had sent the girl—to learn more. "What can we do?" he asked Montgomery.

"You, not we," Montgomery fingered the swollen places on his face. "I stuck my fair neck out far enough, just coming here and warning you." He noticed Quirk's expression and said, half angrily, "Maybe you think I'm not much of a man to let them scare me, but they play rough, and I'm not cut out of the right kinda stuff to be a hero. That's a fact, and you can make of it what you want."

Quirk did not press. "It's your affair," he said.

"Then it's time I got out of here. I don't want Royer and his goon to find me talking to you."

He was too late. Two plainclothes men stepped out of the crowd and took Quirk by the arms. They ignored Montgomery.

The two men guided Quirk around the motel to a police substation in the back, and had him sit on a stool in the middle of the room. They remained standing.

"I am Police Commissioner Royer," the leader of the two said. He was a ridge-nosed, mild-eyed man, with a protruding stomach, but with an unpretentious air of authority.

His assistant was obviously the goon Montgomery had mentioned, bulky and big boned, with a wart on one side of his chin, from which three hairs sprouted whitely. Royer had introduced him, sardonically, as his associate, Steven Linglebach.

"Is George Quirk your real name?" Royer began his questioning.

The next instant Quirk felt his stool being kicked out from under him, and he landed in a sitting position on the floor. "Answer when you're talked to," Linglebach gritted, with much apparent bad humor.

Quirk opened his mouth to speak, and Linglebach swung a backhanded chop that caught him on the left ear with explosive force, addling his brain and temporarily deafening him. He could see Linglebach's lips move but could hear nothing.

Linglebach reached down and grabbed him by the blouse front and jerked him to his feet, and drew back his fist to strike again.

"That won't be necessary, Steve," Royer admonished. "I'm sure the

gentleman will find it in his best interest to answer our questions without your beating him." He reached down and righted Quirk's stool. "Sit down," he said, not unkindly.

Quirk sat readily—his spinning senses needed the support—but he felt little gratitude. He realized he was being subjected to the old "good-guy, bad-guy" routine: the calculated violence of the first, to shock the victim into ready cooperation, and the followup—the pretense of sympathy from the second, eliciting the victim's confidence, and hope for protection from the first.

Quirk felt a dampness in his ear, and probed with a finger, and brought it out smeared with blood.

Royer tsK-tsked. "I've always hated the sight of blood," he said. "Ever since I was a small boy. I wish Steve wouldn't be so impulsive, but I'm afraid he likes to hurt people."

Quirk restrained a rueful grimace.

"Well, back to business," Royer said. "May I ask your home world?" "Earth."

"What is your business on Calixco?"

"No business," Quirk answered. "I'm just a tourist."

Royer smiled, as if at a shared joke. "I could find no evidence of your having registered with our tourist bureau."

"I must have forgotten," Quirk improvised, without much expectation of being believed.

"You will be interested in knowing. I'm certain, that giving false information to a Calixco official is a felony," Royer said. "Should I learn later that you lied to me now, you will be subject to prosecution."

Quirk gave no answer, and Royer

said, "Now I ask you again: what is your business on Calixco?"

"I'm here on a vacation," Quirk answered.

With a show of exaggerated patience Royer asked, "What is your occupation on Earth?"

Which required a careful answer. "I work for the government," Quirk said.

"For the Security Bureau, by any chance?" Royer asked.

"It happens that I do," Quirk admitted.

"If you are on official business, perhaps I could be of assistance," Royer suggested, in an apparent gesture of good will.

"I appreciate that," Quirk went along with the pretense. "However, even a security man takes a vacation occasionally."

"Of course." Royer paced the floor, to the far wall and back again. "I seem to be having difficulty convincing you of the seriousness of your situation," he told Quirk, still without any evidence of impatience. "Will you come with me please?" He hed the way into an adjoining room.

Quirk followed, with Linglebach close behind. The room had only meager furniture, a desk, a chair, and a couch.

On the couch lay the girl, Marthaleen.

At first glance she appeared to be resting quietly, but her body was too carefully laid, too lifelessly still. Quirk edged past Royer and went over to the couch. Marthaleen's eyes were wide open, but unseeing, blank and lifeless. About her neck the fine silver-mesh chain of her necklace had been drawn

tightly. Very probably the work of the sadistic Linglebach.

Quirk turned to Royer. "Why did you let him do a thing like that?" he asked, his voice flat.

Royer did not deny the inference. "She admitted telling you about us," he said, treating the matter as of small concern. "But right now our business is with you. What—"

"She had nothing to tell me," Quirk pointed out, "except that you were looking for me, and that I already suspected."

"We must maintain discipline," Royer answered. "You should understand that."

"You killed her for something so trivial?" Quirk's indignation still did not show in his voice.

"Will you shut up!" Royer's patience had at last left him. "Worry about yourself. She was nothing but a pavement princess."

Linglebach moved toward Quirk. "Listen, chum—" His expression changed then, with just the beginning of an unbelieving outrage at something he read in Quirk's face, and he shifted his feet and raised an arm in front of his face.

Quirk's right fist was already on its way as Linglebach began his belated preparations for defense, and his fist drove over Linglebach's arm and landed flat against his left cheek. Quirk felt the bone give beneath his knuckles.

In the same motion Quirk completed a half-circle and continued on toward the Police Commissioner. Royer had shouted a curse and pulled out a short firearm but had no time to aim and his shot whispered past Quirk's ear as he

drove the commissioner back with a shoulder in his midsection. The wall stopped the savage rush, and Royer's breath exploded from his lungs in a burst of agony.

Quirk let the limp body drop to the floor and strode toward the door, passing the prostrate Linglebach on the way. The goon's jaw hung slack and askew, with blood flowing from his open mouth.

He should have at least a ten minute start, Quirk hazarded, as he left the police station and mingled with the carnival crowd. Further, the police should have trouble following him through the revelers. He worked his way toward the lower section of the city, to the Kreek's place of business.

The alien had been waiting for him. He handed Quirk a plastic pass, signed BENJAMIN ARNOLD, VICEROY. "It will access you to the jail and out without hindrance," the Kreek pronounced. "To acquire assurance double the guards have been purchased."

"Good." Quirk put the pass into an inside pocket, and took out five thousand-credit notes and laid them on the desk. "I may not have time to stop in later," he said. "Now how do I find the jail where they're holding him?"

"With simplicity. Seven blocks walk, straight ahead."

Quirk found a department store three blocks on the way and went into the drug section and bought a wide roll of white tape, a bottle of iodine, a packet of medical cotton batting, and a small pair of scissors. Taking them into the men's room he used the scissors to cut the tape into the shape he wanted, stuck on a few tufts of cotton, and—looking

into the lavatory mirror—pressed the tape across the bridge of his nose, and up slightly on each side of his eyes. It made a quite effective mask. Dabbing the edges of the tape, and the protruding cotton batting, with splashes of iodine, he converted the mask into a dressing for a damaged nose—and he was ready for his try at freeing Podratz.

When Quirk returned to the door of the department store a heavy rain was falling. After a minute of indecision he noted a passing citizen wearing a black slicker, with a hood to keep the rain off his head—and he had a minor inspiration.

He went back and sought out the clothing department of the store and bought a slicker similar to the one he had seen, and put it on. It would provide a more valuable service than merely keeping off the rain.

Outside again, Quirk completed his journey to the jail building and showed his pass to a guard at the door. The guard nodded, as he glanced surreptitiously at Quirk's bandaged nose. "The fellow had a good left," Quirk quipped, and joined the guard in a chuckle.

He was directed to a concrete-enforced inner police post, and—still keeping the rain cowl over his head—presented his card, and delivered his quip. "I'll only be taking a brief look-around," he said. "Though I may want to talk to a prisoner or two."

He received no argument, and said, "Will one of you take me to the cell block, please?"

The taller guard nodded affably, and came around the counter and led him into the main section of the building.

Row on row of jail cells stretched out before them.

Quirk found Podratz in the second row of cells, sitting on a cot with his head in his hands. "I'll talk to this one," he said. "Let me in, please."

The guard evidenced no suspicion, unlocking the cell door and letting Quirk enter.

"I'll need to be alone with him for awhile," Quirk said. "Higher up matters," he confided. "Be sure to lock the door before you go."

The guard obeyed without question. "Rattle on the bars when you're ready to come out," he said, and walked away. The pass and the Kreek's bribe were proving quite effective.

Podratz had risen while they talked, and now looked at Quirk questioningly.

"We have no time to spare," Quirk began without preliminaries. "So listen carefully. I'm from Earth, and I'm here to get you out. Now I'm going to transfer this tape from my face to yours. That, and the raincoat, with the cowl over your head, should do the trick."

"You're going to take my place?" Podratz was a man with an agile mind, and readily saw where the conversation was leading.

"Yes."

"You're quite a man," Podratz said, admiringly.

"I'm a masker," Quirk returned shortly.

"Oh."

"You'll have to get to my ram as fast as you can," Quirk resumed instructions as he transferred his bandage. "It's about two miles from here, under the water of the lagoon by the spaceport. You'll find a water suit . . ."

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Quirk exchanged his slicker for Podratz' prison jacket, and lay on the cot, with his back to the cell door. "Rattle on the bars," he directed Podratz.

He listened as the guard returned and let Podratz out. All seemed to go well. If Quirk could keep the guards deceived for at least a half hour . . .

Nearly an hour went by before Quirk heard a disturbance behind him and turned and saw Commissioner Royer standing at the cell door. With a pistol in one hand.

"You son of a bitch," Royer said.

Quirk rose leisurely. "Were you speaking to—" he began.

A ball of white light burst in his brain.

Quirk had a moment of acute disorientation as consciousness shifted from his surrogate body in the jail cell to the glass case on the wall of the ram—where his brain resided. The anguish of return was always the same, the sense of ir-retrievable loss, as though the bodies of the executed criminals had been his own—lost so many years before. Psychologists had explained that the pain was a normal reflex, that passed quickly.

His photosensor cells were the last to return to normal function, and for a moment he was aware of Podratz only as a blur-edged shadow. His mental ordeal lessened somewhat with the knowledge that the consul was safe.

Podratz must have known of the brief period of masker distress, for he waited until it passed before he remarked, "I still say you're quite a man." He bowed slightly. ■

Edward Wellen

HEROIC MEASURES

**Who is a man, really?
New answers may lead
societies to treat
their members in
a new way...**

Blackness. Then a dazzle of rigidly-massed light-bulb whitenesses stretching out like a computerized football scoreboard. But I seemed alone, and in no stadium. If anything, the stadium was in me, was me. Then, on that scoreboard floating in the great blackness, a march of smaller blacknesses spelled out words.

CAN YOU SEE THIS? IF SO, ROLL YOUR HEAD TO THE RIGHT.

It took me all the deep eternity there is between ticks to realize that the scoreboard was speaking to me. A thought sidetracked me: *Real time happens between ticks*. The message flashed on, off, on, impatiently insistent. It took me another eternity to respond.

Something that was me and yet not me rolled a heavy rock uphill.

The message blanked out. Then one word filled space.

GOOD.

Why good? I rolled the rock downhill; the work proved just as hard.

The scoreboard blinked, then pulled itself together for another message.

RESPONSE CONFUSING. ARE YOU SHAKING YOUR HEAD? CANCEL THAT QUESTION. JUST ROLL YOUR HEAD TO THE RIGHT AND LEAVE IT THERE.

I rolled the rock uphill again and leaned all my imponderable weight against it to hold gravity in place.

GOOD. Then, quickly, THAT IS ENOUGH FOR NOW. SLEEP.

Blackness again.

The scoreboard flashed on.

HELLO AGAIN. DO YOU KNOW YOUR NAME?

Come to think of it, I couldn't think of it.

I rolled my head to the left. I still had no awareness of *having* a head, no sensation of being personally involved, much less a feeling of interfacing with a pillow; I had merely the *thought* of rolling something disembodied as a bowling ball. But it appeared to do the job.

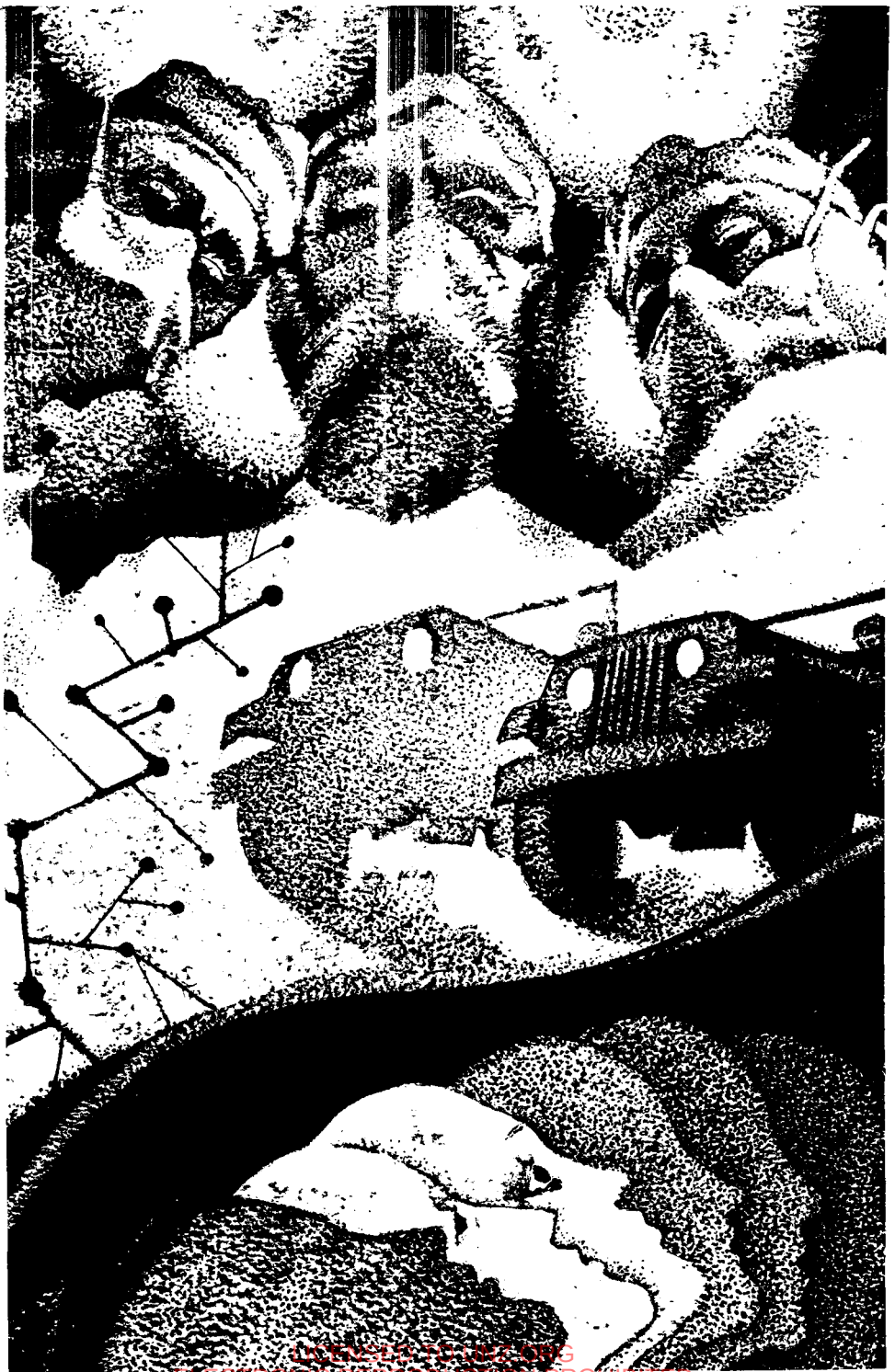
DOES BiDHOPE RING A BELL? I bowled my head to the left.

WELL. TAKE OUR WORD FOR IT, THAT'S YOUR NAME. JASON BiDHOPE.

Why not? It seemed as good a name as any. And since I couldn't come up with a better name of my own for a name of my own, so be it.

But somewhere within me—whoever I was and wherever I was—a nameless dread made the flame of me tremble at the name.

I outgrew the head-rolling. Over a long flickering of time I learned to program the scoreboard and flash my own



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messages.

They—whoever they were and wherever they were—seemed able to look into the stadium of my mind and read the scoreboard. I thought of them as being in a chopper hovering above the open bowl.

I still did not know what game I played.

Pictures now as well as words.

The scoreboard seemed under surer and subtler control. The whitenesses had a whole range now, into the grays, and what's more these half-tone images sharpened.

I knew now the face—front and profile—of Jason Bidhope. I knew his parentage, his schooling, his occupation, his wife's name and look.

I had yet to get the feel of *being* Jason Bidhope.

WE WANT TO SHOW YOU
SOMETHING THAT HAPPENED.

I could stand some entertaining. BE
MY HOST.

The story bursts forth in full color and realistic detail, unfolding on the scoreboard-screen.

One morning in late fall, Sgt. Bidhope reads an unsigned letter that sends him posthaste to his commanding officer. Bidhope remains stonily vague about why he requests immediate leave. Miffed at not being entrusted with the why and the wherefore, and already shorthanded in the face of an upcoming inspection by the brass, the CO turns Bidhope down. The good soldier Bidhope salutes with no change of expression. But once outside the orderly room Bidhope makes for the ordnance depot

and steals a hand grenade. He changes into civvies, forges orders, and drives a motor pool jeep past the guard post.

He stops at a highway phone booth to dial a number, gets no answer, drives on. He pulls up at a motel on the edge of town, grimly spots the license plate of a car parked outside a motel room, takes out the grenade, pulls the pin, kicks in the door, and frags the couple startled awake in bed.

For the echo's duration Bidhope stands unmoving in a sort of post-coital sadness. But the motel manager has phoned 911, and at the sound of sirens Bidhope stirs himself to make a run for it. He has a copy of the car's ignition key on his key chain. He hops into the car and roars away.

There's a chase. (I liked this part best: it was deathly alive with heart-stopping skids, near-head-on collisions, jumping of dividers, and the like.) But at last the forces of order and law box Bidhope in. Roaring toward a roadblock, he executes a bootleg turn, jamming the brakes and cutting hard left a quarter-turn so that the car jumps up onto two wheels, spins about, and heads the other way. The chase ends when a cop shoots the car's rear tires to shreds. Bidhope totals the car but comes out of the wreck in one recuperative piece.

He stands trial. There's a nice twist in that the woman he's killed is not his wife but his wife's best friend. Throughout the trial Bidhope feels his wife's eyes on the back of his head. The jury brings in a guilty verdict. The judge sentences Bidhope to death.

Despite Bidhope's refusal to beg on his own behalf, lawyers with an affinity for the press file appeals till the last

appeal is exhausted.

On death row Bidhope passes the time by playing solitaire.

The night before the execution he makes a bomb out of playing-card cellulose and cot-leg casing and blows himself up. Here the story ended.

THERE YOU ARE. WHAT DO YOU THINK OF IT?

I would have applauded if I could. Then it struck me I could. I projected a stick figure on the scoreboard and clapped its spidery hands. And I meant it. Not the least entertaining feature had been to see myself playing the role of protagonist.

Then it came home to me. *Something that happened.* The role had been the real thing. I had just seen from the outside what once I had seen from the inside. That had to be what they wanted me to make of it. I stalled.

INTERESTING. SO?

DON'T YOU GET IT? THAT IS YOU.

I fought to disbelieve. YOU TELL ME THAT IS ME. BUT HOW DO I KNOW YOU TELL ME TRUE?

WHY WOULD WE LIE TO YOU?

I had a triumphant thought. BUT IF THAT'S TRUE, I'M DEAD. I knew I had them there: they had shown me blowing myself up.

YES, SOME MIGHT CLAIM YOU WERE CLINICALLY DEAD. BUT MEDICAL HELP REACHED YOU IN SECONDS. PRISON DOCTORS HOOKED YOU UP TO LIFE-SUPPORT SYSTEMS, KEPT YOU GOING TILL SURGEONS COULD BEGIN REPAIRS. YOU DID YOURSELF A LOT OF DAMAGE, YOU KNOW. HOWEVER, WE'VE PATCHED YOU

UP, PUT YOU BACK TOGETHER. BRAIN SURGEONS HAVE SPREAD A TEFLON FILM WITH PLATINUM-DOT ELECTRODES ACROSS YOUR VISUAL CORTEX. INTEGRATED CHIPS AND FIBER OPTICS DO THE REST. AND NOW THAT YOU'RE WHOLE ENOUGH AND WELL ENOUGH TO UNDERSTAND WHAT YOU DID AND THAT YOU MUST PAY FOR WHAT YOU DID, THE TIME HAS COME TO WHEEL YOU INTO THE DEATH CHAMBER AND CARRY OUT THE SENTENCE OF THE COURT.

I exploded all over the scoreboard. YOU BROUGHT ME BACK FROM DEATH JUST SO YOU COULD JUDICIALLY MURDER ME?

JUST SO. SOCIETY DECIDED YOU MUST PAY IN A PRESCRIBED MANNER FOR YOUR CRIME OF PREMEDITATED MURDER. WE CAN'T LET YOU CHEAT SOCIETY OF THAT DEATH. YOU SEE THAT, DON'T YOU?

I found myself suddenly calm. I SEE THAT I'M A WHOLLY DIFFERENT PERSON. I DIDN'T KNOW I WAS JASON BIDHOPE. YOU FORCED HIM ON ME. YOU'RE KILLING THE WRONG MAN.

YOU'VE GIVEN US SOMETHING TO THINK ABOUT. Blankness for a time. Then, NO. THE SENTENCE MUST STAND.

Having made my case, I stopped. I could be just as stubborn as Bidhope in refusing to beg for life. ALL RIGHT. IT DOESN'T MATTER. I CAN TAKE THIS BECAUSE I KNOW LIFE'S PLAYED ITS SADISTIC GAME ON ALL OF US.

WHAT DO YOU MEAN?
DIDN'T LIFE SHOW US THE
BEAUTY AND TERROR OF THE
UNIVERSE, THEN MAKE US
AWARE WE'RE ALL UNDER SEN-
TENCE OF DEATH?

YOU HAVE A POINT THERE.
WELL, HERE WE ARE. YOU'LL
HAVE TO FORGIVE US, BUT THE
TIME IS NOW. DO YOU WISH ANY

COMFORT?

NO.

DO YOU HAVE ANY LAST
WORDS?

I had none.

The End

Blackness. Then a new dazzle.

JASON BIDHOPE HAS PAID. NOW
YOU ARE FREE TO BEGIN.■

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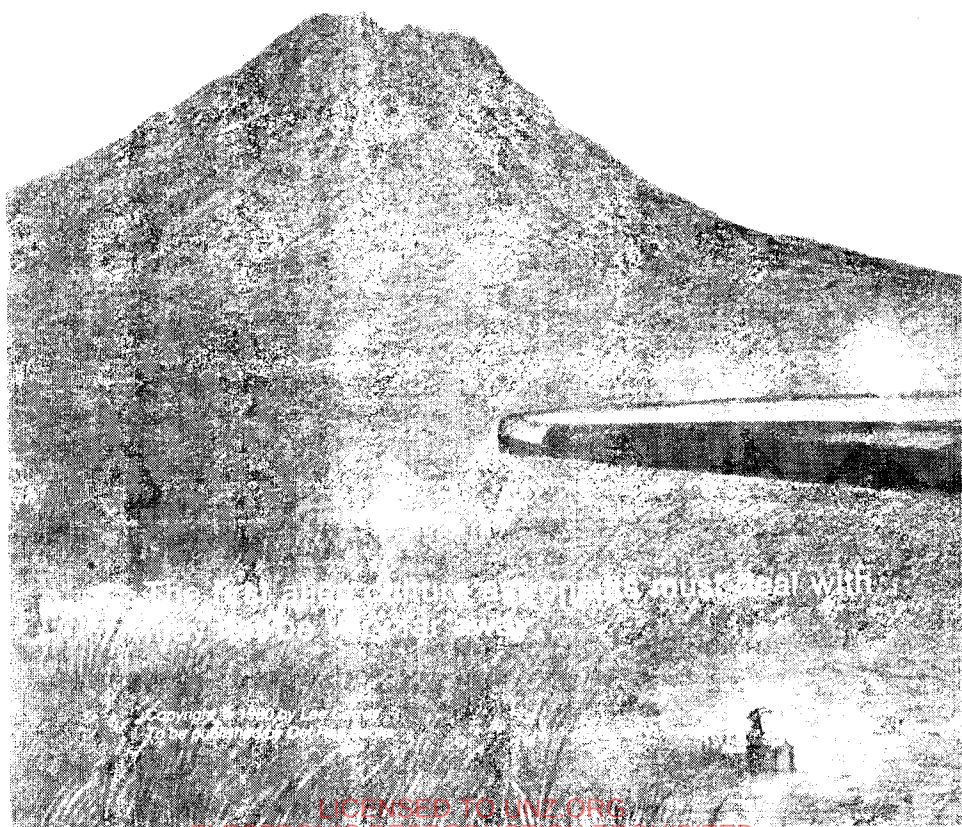
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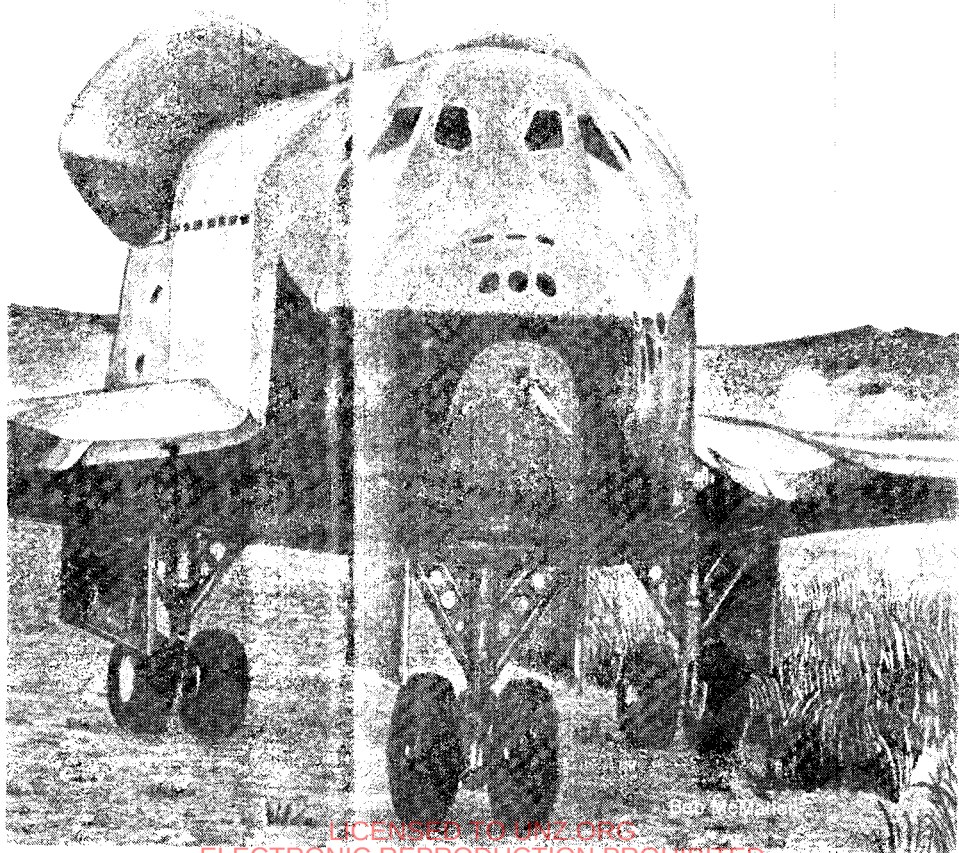
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On a routine mission to place a civilian Landsat into sun-synchronous polar orbit in a southerly launch from Vandenberg Air Force Base, California, the NASA Space Shuttle Orbiter OV-104 Atlantis suffers a major propulsion malfunction. Shuttle Commander FRANK KING manages to land the Atlantis on Mataverí Aerodrome on Easter Island (Isla de Pascua) with the help of his co-pilot, LEW CLAY.

The "contingency landing" sets in motion Project Shuttle Down at the NASA Johnson Space Center where Mission Manager RED RICHARDSON rides rough-shod over the procedures-oriented old-line NASA people to get the job started. He puts NASA Headquarters Public Affairs specialist CASEY LASKEWITZ to work handling the news media.

NASA has no "contingency landing agreement" with the Republic of Chile which owns Isla de Pascua. ALFRED M. DEWEY of the State Department is assigned the task of diplomatic co-ordination with Chile. He puts his young subordinate NASH SULLIVAN on the job with the UN in New York and the attractive JOYCE FISHER in charge of on-the-spot diplomatic affairs in Santiago and Isla de Pascua.

Isla de Pascua, 2000 miles from both Santiago, Chile and Tahiti, cannot handle the more than 100 people required for the recovery. These facts cause Richardson and U.S. Air Force airlift officer COLONEL MATT HUBBARD headaches. They'll have to airlift a complete city to support the recovery teams on Easter Island.

In the meantime, Frank and the crew of the Atlantis—co-pilot Lew Clay, payload specialist HAP HAZARD, and mission specialist JACKIE HART—evacuate the Atlantis as quickly as possible since there are more than a thousand pounds of toxic nitrogen tetroxide propellant still aboard. They are greeted by CAPTAIN ERNESTO OBREGÓN, the military governor of Isla de Pascua, along with Catholic priest FATHER FRANCISCO and DOCTOR VICTOR ESTEBAN. Because nobody in NASA planned for the emergency, none of the crew of the Atlantis has passports or other identification, nor does the Atlantis carry any of the documents required by international law. Because of the poisonous nature of the propellant left aboard the Atlantis, Obregón waives arrival formalities and gets in touch with Santiago by radio immediately.

During the initial planning meeting at Johnson Space Center, problems keep confronting Red Richardson. The NASA 747 recovery aircraft doesn't have the unrefuelled range to get the Atlantis back from Isla de Pascua. Matt Hubbard says that the C-5 Galaxy transports can't be landed at Mataverí until turnarounds are built at the ends of the runway and additional parking ramps constructed. This forces Red Richardson into operations not covered by the procedures manuals, much to the dismay of his boss, procedures oriented DUKE KELLOGG.

However, the landing of the Atlantis has not gone unnoticed in international circles.

The Soviet Union accuses the United States of launching a military beam weapon satellite in the Atlantis, not a

Analog Science Fiction/Science Fact

civilian Landsat. The Soviets demand that the Republic of Chile intern the Atlantis and its crew until a U.N. commission can come to Isla de Pascua to inspect the payload. Their motivation is the elimination of the U.S. from competition in the growing field of space processing.

Although this throws the State Department and NASA headquarters into panic, it has little effect on those who are on the spot on Isla de Pascua. As the recovery operations get under way from Houston, the crew of the Atlantis is forced to sit and wait for help to come.

CHAPTER FIVE

The Hangaroa Hotel was far from being a Holiday Inn. The government of Chile had built it to accommodate a hoped-for increase in tourism that was a part of the foreign policy but Lew thought they could have used some help from one of the big American hotel chains in designing a somewhat more modern place.

"Welcome to beautiful downtown Hangaroa," Jackie muttered as they rode through the unpaved street—there was only one path that could roughly be called a street—of Hangaroa, the only center of habitation on Isla de Pascua and the home of more than a thousand Pascuans and the garrison of the Armada de Chile. It wasn't quite what the crew of the *Atlantis* had been led to expect by motion pictures of South Pacific islands . . . but Isla de Pascua couldn't exactly be termed a south sea island in the same league as Tahiti or Pago Pago.

Shuttle Down

Jackie also had a word for it. "Quaint," she said.

The hotel manager, José Hey, was also the clerk. And, as the crew of the *Atlantis* learned, he was also the Mayor of Hangaroa.

"We are honored to have you on Isla de Pascua," José Hey bubbled eagerly as he welcomed the four along with the military governor into the lobby-patio of the Hangaroa Hotel. He was a small man, shorter than either Lew or Jackie. His jet black hair was trimmed closely, and his features were a strange cross between Amerindian and Asian. Frank thought the man looked a little like some of the native Hawaiians he'd known.

"Thank you, Mister Mayor," Frank replied courteously. "Under the circumstances, you don't know how pleased we are to be here. I've heard this island's very unusual . . ."

"If there is anything about Isla de Pascua you want to know, I am the man to ask," Hey boasted. "I am the most important man on Isla de Pascua. People have come from all over the world to see me—anthropologists to ask me questions about how we live, archaeologists to find out about the long ears and Hotu Matu'a, and doctors to take samples of my ear wax and blood."

"We'll be certain to keep that in mind, Señor Hey. Looks like we'll be here for a few days at least . . . or until we get some help to get the *Atlantis* out." Inwardly, Frank was profoundly disturbed that communications with Houston had been temporarily cut off, forcing him to twiddle his thumbs and wait for others to take action. That wasn't the way he liked to operate, but he was forced to do it now by circum-

stances he wouldn't have believed existed in the world these days.

As they walked together through a sunlit portion of the lobby, José Hey suddenly stopped in his tracks, his mouth hanging open. "Makemake!" he breathed.

"*Que pasa, José?*" Captain Obregón asked.

"Look at the four of them," the Pascuan breathed.

The bright sunlight was back-lighting the white nomex coveralls worn by all four members of the crew of the *Atlantis*, making the fabric shine and shimmer. At the edges, the synthetic fabric—whose threads were not white but transparent—caught the sunlight and broke it into little multi-colored spectra.

"The legend," José Hey whispered, "talks of Makemake and the *akuaku* descending from the skies with clothes as white as a cloud and edged with rainbows . . ."

"José," Obregón reminded him gently, "what will Father Francisco think? The stories of Makemake are gone with the old religion . . ."

"Then perhaps these four are *tangata-manu*, the birdmen, come to bring new life to Rapa Nui and those of us who live here."

"Señor Hey," Frank broke in, "I assure you, we're people just like you, regardless of what your old legends say. Sorry, but gods we're not."

Hey was undaunted. "We will see, Miti Thayer. You must have a very powerful and benevolent *akuaku* . . ." He walked behind the registration desk and produced a register book. "If you will all sign in, please. And the Gov-

ernor requires that you give me your passports . . ."

"You may forego requesting their passports, José," Obregón told him.

As each of them signed the big book, José Hey went on, "We are planning a big hula for you tonight. Many of us watched your big black plane come silently over the island and land at Mataverí. We have seen nothing like it before. Doctor Esteban tells us you fly it to the moon. So we must have a big celebration in your honor."

"Well, not exactly to the moon, Mister Mayor," Hap Hazard tried to explain.

Frank turned to look at Obregón who simply nodded. "It's time for a celebration," the military governor said.

The rooms were not those of any American hotel or motel, but they were clean and the fresh breeze of the South Pacific blew through windows overlooking the late afternoon sea where the sun was just beginning to edge toward the horizon.

Captain Obregón stayed behind with Frank and, once José Hey had left, confided to the Shuttle crew, "All of you must remember that the Pascuans see and know little of the outside world, in spite of the efforts of the Chilean government to operate schools here. We have a few tourists and occasional teams of scientists who're interested in the *moai* and the *rongaronga*. So your arrival gives me an excellent opportunity to break the routine of everyday living by authorizing people to leave Hangaroa for a hula. As my guests, you're all free to move about the island as you wish, but I must ask you to agree to several things . . ."

Frank nodded and replied, "Whatever you wish, Governor . . ." This was a strange situation for an astronaut to find himself in, and Frank knew he had to make the best of it.

"Please stay away from the Pascuan women. Guard your valuables and beware of the natives who are all thieves and liars."

"You can't be serious," Hap said in disbelief.

"I'm afraid I am. The government doesn't encourage fraternization with the native women, which is why the men in my garrison have their families with them. Our government has no money for supporting illegitimate children of native women. And as for my remark about theft, the Pascuans manage to steal several hundred sheep every year from the sheep breeding station of the Armada de Chile in spite of the fact that no Pascuan can leave Hangaroa village without a permit from me. They have no concept of property."

Frank wasn't believing what he was hearing this dapper little Chilean military governor say. This was the Twentieth Century . . .

"How can you treat them as second-class citizens?" Jackie wanted to know.

"Señorita, I was schooled in America," Captain Ernesto Obregón replied deferentially, "and I understand some of your feelings. But this isn't America, and we're dealing with people who don't share our values. I, too, personally deplore some of the regulations I must enforce. But these rules and regulations have come about as the result of decades of trying to work with the Pascuans . . ."

"If the Pascuans are thieves and liars,

please get guards around the *Atlantis*, but at least a kilometer away" Frank told him.

"They're already there."

To say that Alfred M. Dewey was working harder than he'd ever worked in his life was perhaps an understatement. Quitting time came and went, and he was still at his desk and on the telephone. He called his wife and told her, much to her surprise, that he wouldn't be home for supper. He'd missed his car pool, too, so he asked her to drive down to pick him up later that evening when he called. Little did he know he wouldn't get the chance to call her.

"Look, Sullivan," he told his young subordinate whom he'd sent to New York earlier in the day, "tell the Ambassador that NASA is perfectly willing to send all the payload documents for the *Atlantis*. They'll prove there's no military payload aboard."

"The documents will help, sir, but I can't seem to convince some of the people on our own U.N. staff that those payload bay doors can't be opened without special rigging that has to be flown in to Isla de Pascua," Nash Sullivan replied over the phone from the U.S. delegation's offices at the U.N. in New York. "I think NASA's going to have to send a team of experts up here. Our staff's working on the possibility of holding a special briefing for those members of the Security Council who wish to attend . . . but I don't think we stand much chance of getting the Soviets to come at all. They'll boycott the briefing. They know they've got no case, but they'll play it for all it's worth."

"I'll see if NASA will send that briefing team up," Dewey said, making yet another note on a pad that was rapidly being filled up with such notes. "In the meantime, suggest to the Ambassador that he make an offer in the Security Council to permit an inspection team to accompany the NASA rescue mission to Isla de Pascua. I'm sure that NASA can accommodate such a request . . ."

"That'd be an excellent idea, sir, but it'd help if I had the NASA briefing group here to provide the necessary technical data. I'm capable of giving the briefing myself, but since I'm with the State Department I don't have believability. Even our own U.N. staff people have questioned my technical expertise . . ."

"Sullivan, stay on it and stay where you can be reached. I've got a call coming in on another line," Dewey broke in. He broke the connection with Sullivan in New York and punched a flashing button on his phone. "Alfred Dewey, Technology Liaison . . . Ah, yes, good evening, Señor Prieto!"

The *chargé* from the Chilean Embassy told Dewey in a smooth voice, "Señor, my government has informed me that it intends to be as cooperative as possible in the rescue and return of the *Atlantis* from Isla de Pascua. However, in view of the charge made by the Soviet Union, my government has asked me to forward to your government a number of requests . . ."

"We'll be most happy to comply if we can, Señor Prieto."

"Good. Actually, they are not requests. They are conditions that are attached to my government's permission

for your government to send military equipment to Isla de Pascua along with a very large number of American technicians," the *chargé* explained.

"What are your conditions, Señor?"

Dewey tried not to permit wariness to creep into his voice, but he'd done business with people from Latin American countries for a long time, and he knew there was going to be some sort of expensive condition involved . . . one that was, of course, perfectly legal if ethically questionable. One had to understand the ancient ethics still predominant in that part of the world . . . and in most parts of the world, for that matter.

"My government is concerned that the Soviet claims may cause certain . . . entities . . . to attempt to create problems. Isla de Pascua is very important to the Armada de Chile because of the large number of sheep that are raised there. A United States military presence on the island even for the avowed purpose of reclaiming the downed space craft might be viewed as the preliminaries to a more permanent United States military presence on the island and in my government's strategically important zone of defense in the South Pacific Ocean." Whatever the *chargé* was getting at, he was certainly prefacing it with prolific preambles and justifying rationales. "Therefore, my government's military and naval forces will participate and assist you in any way possible . . ."

"That's very kind of your government," Dewey replied. But Prieto hadn't come to the hooker yet, so Dewey was still wary, but trying not to let it show. "I'm certain that the details can be worked out between our respective op-

erating personnel

"I am certain they can," Señor Prieto replied. "I am certain also that your government realizes that this is going to cost my government a considerable sum of money to provide the necessary assistance"

"What did your government have in mind, Señor Prieto?" Here came the kicker, Dewey told himself.

"I am certain that your government would be willing to reimburse my government for the expense entailed in the activity."

"I'll look into the matter and have a reply for you shortly."

"Good. But there are other conditions we must discuss, Señor Dewey. It is my understanding that NASA and your Air Force will be moving a great deal of equipment onto Isla de Pascua for use in this recovery activity. It would greatly simplify the customs operations if the equipment could be consigned to the government of Chile. This would not tax the customs facilities or personnel at Santiago or Isla de Pascua since the equipment would belong to my government and would not require clearance through customs," Prieto went on. "I'm sure you realize that customs regulations require a great deal of time and effort to clear large and expensive pieces of equipment for entry and later for departure. This suggestion from my government would permit a rapid transfer of the equipment to Isla de Pascua with a minimum of red tape and delay"

It was quite clear what the *chargé* had in mind. "I'm not sure that the aircraft involved can be consigned to your government, Señor Prieto. All aircraft in-

volved will be required to bring out the spacecraft, the very special equipment, and the people involved."

"The aircraft are quite properly registered to the United States," the *chargé* put in. "We would hardly expect them to be consigned. There will, however, be landing fees involved along with ground service charges and other costs at Santiago and Mataverí"

Things were obviously going to become expensive. Dewey didn't know where the funds were going to come from. State would have to find them somewhere—NASA, DOD, somewhere. But that wasn't his problem.

"Señor Prieto, I can state that my government will certainly be willing to take care of whatever costs are involved, but I'll have to check into the matter of consigning the equipment"

"You have no idea how it would simplify the customs procedures, Señor Dewey"

"Oh, I do indeed, Señor Prieto."

"It would also simplify the issuance of visas and work permits if Chilean organizations were contracted to make the necessary alterations to the airfield and perform the other construction tasks needed for the operation of your equipment such as concrete pads and so forth I have a list of approved contractors."

"May I get back to you this evening on some of these points, Señor? Our people are very anxious to get to that spacecraft because of the nature of the rocket propellants that are still in it."

"I am aware of the need for expedient action. But I must also discuss one final matter with you"

My God, weren't they asking for enough under the table as it was? Dewey asked himself. "And that is?"

"My government must be allowed to send a commission with members of its choice to Isla de Pascua with your initial aircraft to inspect the payload of the *Atlantis* in order to protect my government in view of the claims of the Soviet Union."

"No problem, Señor. I can already vouch for that."

"Excellent. If you can get back to me concerning these matters, I will see to it that the necessary protocol and clearances are arranged at once."

Alfred M. Dewey hung up the telephone and put his head in his hands.

Why did this have to happen to him? He'd been sixteen years with State handling interfacing between the Department of Commerce and various South American governments when it came to trade shows, technology export, and international marketing problems that Commerce couldn't handle themselves. The job had rarely been easy; there'd always been a great deal of paperwork involved as well as contact with various embassies in Washington. There'd been a certain amount of quiet *baksheesh* as there always was in any sort of international trade, and there were always hookers involved in the form of "import agents" who happened to be relatives of whomever was in power at the time. There were quiet and unwritten contracts involving "consultants" in other countries. That was the way international trade had been carried on for centuries; only the titles of the middlemen had changed.

Dewey himself had been extremely

careful not to become involved in such affairs. In the first place, Department regulations stipulated that he couldn't. And Alfred M. Dewey really liked his job. It was secure. There was competition within the Department, to be sure, but never to the extent that he had to worry about a job.

"Four years left, and this happens!" he moaned to himself. He had to hang on only another four years to qualify for "twenty and out" retirement. And now, when his goal was almost in sight, he discovered himself right in the middle of the very things he'd tried so assiduously to avoid for sixteen years.

With almost savage ferocity, he grabbed the telephone and dialed Johnson Space Center of the FTS.

Joe Marvin answered. He sounded harried. "Shuttle Mission Control. Marvin here. Wait one, please . . ."

Then his voice was muffled as he called to someone in the room. "Pete, try to raise them on one of the international ARTC frequencies that they're supposed to be guarding." His voice came back loudly. "Sorry about that. Go ahead, please."

"This is Alfred Dewey at State. Is Joyce Fisher available?"

"Oh, the gal from State? Sorry, she departed with the initial group from Ellington a few minutes ago."

"I've got to talk with her," Dewey insisted.

"Hang on, sir. We'll try for an air-to-ground patch through Ellington. Let me turn this over to my communications specialist, Jeff Landers . . ."

The line went dead as Marvin put him on hold. Sitting there with the phone to his ear, Dewey got to feeling worse and

worse. He looked at the wall clock and realized he'd missed dinner. It was the first time it had ever happened to him.

The Lockheed C-130 Hercules was designed and built as an all-around medium military transport plane, a maid-of-all-work. And that it was indeed. But because of the intended universality of its function, passenger comfort wasn't one of its salient features. In comparison to the NASA executive jets or commercial airliners, passenger accommodation left much to be desired. To some extent, this was true of all other USAF transport aircraft with the exception of the plush VIP transports, the queens of MAC, the VC-135B's of the Presidential Flight.

Red Richardson knew that this C-130 ride would be no VIP flight. Joyce Fisher found it to be a totally new experience. It annoyed Casey Laskewitz because the relative paucity of creature comforts didn't make his job easier with one of his special passengers. Alice Arnold, who *really* wasn't prepared for the spartan conditions of this flight. Herb Haynes, on the other hand, seemed to be taking it in stride.

The Hercules is a hauler, but it was taking three Herks to get the initial operation under way. The eight men of the hypergolic propellant handling crew aboard the first C-130 were complacent; they were doing their job, they were drawing hazard pay, and they were drawing *per diem* with no place to spend it, a very unusual situation when it came to government travel. The load of that first C-130 was mostly people plus the propellant handling gear.

Richardson was fretting about the

second Hercules. It had runway construction equipment aboard to enable the Mataverí runway to be given turn-arounds and to extend the parking ramps. But the Herk wasn't with the formation yet; it had to fly over to Houston International to pick up a low-slung tow tug from Eastern Airlines. There was no word from the flight deck yet that the second ship had taken off.

The third ship could be seen off to the left if you knew where to look for its lights through one of the little round portholes. This third Hercules was a flying fuel tank. In addition to the almost 10,000 gallons of jet fuel it carried in its regular tanks, the cavernous cargo hold was filled with additional fuel bladders holding an additional 6,500 gallons. Number Three was the insurance policy; it could carry enough fuel to make certain that the other two could return from Isla de Pascua to Santiago.

First stop was planned at Panama for topping off. The planes had more range than that, but Colonel Matt Hubbard hadn't managed to make all the arrangements at Lima and Santiago for landing and fuelling when the flight took off from Houston. "We'll have it all in hand by the time you reach Panama," Matt had promised Red. "If not, you'll at least be on the ground and partway there. And you'll have enough fuel to get all the way to Santiago if you have to bypass Lima."

Red hoped so. There were glitches showing up in the plans now, not the least of which was the Soviet claims at the U.N.

Although conversation wasn't easy—the C-130 was noisy from the slipstream rushing past the fat fuselage

and the beat of the huge props being turned by the turbine engines—Red decided to use the opportunity to learn something about the other side of the house from Joyce Fisher. Besides, Joyce was not an unattractive young woman. There was something about her, something in the way she looked or moved or spoke, that both disturbed and fascinated Red Richardson, one of the legendary NASA bachelors who seemed married only to his job, the agency, and space flight.

“Joyce,” he started out, getting on a first name basis right away because he was, after all, the boss of this operation. “I’m going to be counting on you heavily from here on. You’re my connection with State, and this affair seems to be getting more involved with international diplomacy all the time. What’s the latest word on that, by the way?”

Joyce edged over in the passenger seat so she could be closer to Red and therefore not have to speak as loudly. These were typical, universal Air Force Tactical transport seats, built for ruggedness, capable of being installed and removed from various aircraft quickly, able to hold an armed paratrooper with his pack and weapons . . . and totally uncomfortable for anyone else to sit in for hours on end. As a matter of fact, they may have been uncomfortable for paratroopers, too, but those men had other things on their minds when riding in C-130’s. “I haven’t heard a thing from my boss in Washington since I last talked to him during the meeting in Houston,” she replied. “I don’t expect to hear from him until we reach Panama later tonight, if he’s still in his office.

I’ll try to call him when we land . . . ”

“Do you think this Soviet claim is going to cause us any trouble in Santiago?” Red wanted to know.

She shrugged. “Perhaps. Perhaps not. I don’t mean to give you a wishy-washy State Department diplomatic answer, but I just can’t figure all the angles. Chile’s a big question mark right now. We practically had to pull out of there under the Allende regime, but we were welcomed back with open arms after the junta took over in 1973. The latest trouble has forced the junta to put some of the socialists into various government positions to speed up the democratization process . . . and we just don’t know the extent to which some of the new people are influenced by Moscow or Havana. I’ll be able to tell you more once we get there and I can talk to some of my friends privately . . . ”

“You’ve been in the foreign service there?”

She shook her head. The fact that the noise level of the Hercules was so high that she had to lean over quite close to Red didn’t bother Red at all. Her pug nose was kind of cute, he decided. “My father was in the foreign service there before they transferred him back to Washington and put him on a Latin American desk. I was a teenager when I left, but I still have lots of friends there . . . ”

“I’m glad. You speak the language. I never had time to learn a language.” Red told her. He had to lean over quite close to where her ear was covered by her dark hair; it wasn’t an unpleasant way to conduct a conversation. “Took two semesters of German to satisfy the

language requirement, but I don't speak or read it any more . . . "

"We're going to be working together on this thing for a couple of months," she told him. "May I call you Red?"

"By all means," he told her with the first grin he'd managed in more than a day. "Let's keep protocol to a minimum . . . even with the Chileans. We've got a tremendous job to do. Isla de Pascua isn't the easiest place in the world to run an Orbiter contingency recovery . . . "

She shook her head. "Perhaps we can maintain the usual informality among Americans but not with the Chileans," she warned him, "or with the Pascuans. You're going into a totally different culture, Red, and it's my guess that it'll drive you bats."

"Why do you say that?"

"Unlike a lot of the government types I have to deal with in Washington, you're task-oriented," she observed. "You're determined to get the *Atlantis* off Pascua as quickly as possible, and you'll move mountains to do it."

"Damned right," he told her firmly. "That's one-quarter of our manned space capability sitting idle and useless . . . And we're not going to be able to get any additional space flight capability until and unless we can show everything we've got is working steadily and scheduled up tight. We've already been told this by several Administrations. Nobody in the Oval Office or on the Hill is going to push for more space activity until we show them what we can do out there, things that mean something to them and that they can use to their benefit or for their profit . . . "

Joyce looked at him carefully for a moment, then leaned over and said to him, "You're pretty evangelistic about the space program, aren't you?"

"Nobody's ever put it that way before, but, yes, I guess I am. I'd have to be to put up with the sort of stuff I have to take in this job."

"Tell me something: what's the space program going to do for people of the Third World, people I know . . . the people of Chile or Isla de Pascua, for example?"

Red had a quick answer for that. "All sorts of Earthly benefits and spinoffs. Instant communications. Worldwide television. Well, we've already got that, to some extent."

"We do? Why can't we talk with the *Atlantis* right now?"

"Because we've just started *using* space and not everyone's involved yet. But they will be. In the next few years, we'll be making products up there. We'll be tapping the sun for energy to beam to Earth. We'll be moving industry off Earth and into space to help stop pollution. We'll eventually be getting all our raw materials from the solar system so that we no longer have to tear up this planet . . . "

Joyce Fisher shook her head sadly. "You're a dreamer . . . "

"That's right."

"You haven't got the foggiest notion how the rest of the world lives and thinks . . . "

"Wait until we get to Isla de Pascua and set up the satellite ground station," Red promised her. "You'll see what space can do for people."

"Don't be so sure," she warned him. "Remember, we're stepping into a to-

tally different culture. And *that's* the prime reason I'm along, not as a translator, but to act as a buffer between our cultures"

The crew of the *Atlantis* had no such cultural buffer.

But Hap Hazard turned out to be the closest thing to it.

There was no way any of them could change their flight suits. The survival kit they'd brought from the *Atlantis* had no fresh clothing. Frank considered the alternatives and managed a quick bath, *although the water that dribbled from the taps over the tub was so chemically hard with a tinge of sulfur odor that the bar of rough soap would barely work up a lather for him.* And the water wasn't very hot, either. After drying himself with an amazingly soft towel, he put his flight-worn clothing back on. He wished he had some deodorant and hoped the Pascuans wouldn't notice.

The landing had caused him to sweat considerably more than had been apparent to the other crew members.

Hap knocked on the door to Frank's room as the pilot finished climbing back into his flight suit. The payload specialist had his arms full of emergency survival rations from his part of the contingency landing kit. "Hi, just thought I'd suggest we all bring along some things from the survival kits as gifts and presents . . . which would be helpful to us if a hula here is anything like a *luau* in some of the Polynesian islands"

"Where did you pick up all this background data?" Frank wanted to know. "You been to the South Pacific before?"

"No. But, cripes, there's books in the library at JSC."

"I don't know," Frank began. "Maybe we shouldn't give away our survival rations"

"You think they're not going to feed us?" Hap wanted to know. "They don't look like they're starving here. Why not give some of it away to them? Make us look good, and give them something they've probably never had before."

"Sure, like my Dad told me it was in Europe with Hershey bars and nylons and cigarettes It was Lew who'd walked up behind Hap. "Why not?"

"Come on in," Frank urged the two. "Lew, this isn't NASA Road One or the strip at Mohave. Remember what Obregón told us about the native women"

It didn't faze the co-pilot. "Frank, just because you're a happily married man, don't begrudge us bachelors our hobbies"

"What about your hobbies?" It was Jackie who appeared in the door. She'd managed to somehow arrange her short-cropped blonde hair as attractively as she could under the circumstances, and she'd managed to put on some lipstick . . . which caused Frank to wonder where she'd managed to pack cosmetics for a Shuttle flight.

"Come in, Jackie. Hap suggests we take along some of the food and goodies out of the contingency kit as gifts at the hula," Frank told her.

"Government property," Jackie pointed out.

"That it is," Hap agreed, "but we're still on government time."

"And Lew was thinking he might use it as bait, right?" she asked rhetorically.

"Speaking of that, Jackie," Frank broke in, looking levelly at her, "what the military governor said about the native women probably also applies to the native men."

Jackie snorted. "Who needs them? On the other hand, the military governor's pretty cute . . ."

José Hey came for them shortly thereafter, and Obregón was waiting in front of the hotel with his jeep. The trim Captain in the Armada de Chile looked at the cans and plastic sacks that all four Shuttle crew members carried and dumped into the jeep, then he looked at Frank.

"Gifts," Frank said, "from our survival kit, which we won't need now, thanks to your hospitality."

Obregón nodded. "These will be welcome. There's little variation in our diet here. But you shouldn't give them to the Pascuans . . ."

"Why, Governor, are you afraid they might get a taste of modern food and begin demanding more of it?" Jackie asked sarcastically.

"Jackie, shut up," Frank snapped. "Sorry, Governor, that was uncalled for, and I apologize . . ."

"No offense," the trim officer replied. "I went to military school in America. I'm familiar with American women . . ."

The primitive road led north out of Hangaroa to where a large crowd of people had gathered about a mile away from the village. Dominating the grass covered plain was a small volcanic cone to the east. But the gaze of the crew of the *Atlantis* was fixed on the seven huge stone statues standing in a line to the northeast, the stoic faces looking west-

ward into the rays of the setting sun.

"The famous Easter Island statues," Hap mused.

"No, Miti Hazard," José Hey put in, "those are only seven of the *moai* that we have managed to put upright again on this *ahu*."

"Only seven? How many are there?" Lew asked.

"Hundreds," Obregón remarked.

"Why so many?" Jackie wondered.

"Each *moai* looks out upon that part of the world for which it is responsible," Hey explained quietly, "because Rapa Nui is *te Pito o te Henua*, the Island at the Center of the World."

Hap nodded. "Yes, I guess you're right. It's the center of the world. Depends on how you look at it."

There must have been a thousand people gathered there in the dusk. Fires were burning in several locations. Sheep that had been slaughtered only that afternoon were now roasting in the midst of volcanic rocks made hot by the fires.

"Where'd you get the wood?" Frank asked Hey. "I haven't seen a tree on this island."

"The fires are made from dried *tora* reed that grows in the crater lakes of Rano Roi, Rano Raraku, and Rano Kao," José Hey told him. "Because of your arrival, the governor authorized the slaughtering of many sheep for the hula . . . so we will all eat well tonight, thanks to you."

As they were guided by Obregón to an obvious place of honor in the assemblage—it was getting hard to see what was going on now that the sun had dipped below the horizon, bringing with it the rapid semi-tropical night with its

short twilight—Hap asked the Mayor of Hangaroa. “You don’t go hungry here, do you?”

“No, there is *taro* and *ti*, but few fish now,” Hey replied. “Mutton is a treat.”

“But isn’t sheep raising one of the major activities of Isla de Pascua?”

It was the military governor who explained tonelessly, “The sheep belong to the Armada de Chile, and we export seven tons of wool per year from Isla de Pascua. Therefore, the sheep are not to eat. But no one goes hungry. By government regulation, each family gets three kilograms of meat per week. If all is well, there’s one free sheep for every two people every month . . .”

Lew whistled. “Boy, I knew we’d landed out in the boonies, but I didn’t think it would be the end of the world and the beginning of time, too.”

José Hey, the Mayor of Hangaroa, smiled as he sat down and indicated places for the honored guests to also sit on the reed mat. “No, Miti Clay, you are at *te Pito o te Henua*.”

CHAPTER SIX

The navigator clambered down the aluminum ladder from the flight deck and made his way through the dimly-lit rows of seats to where Joyce and Red were sitting. “We’ve sure got popular people aboard this flight,” he told them. “Miss Fisher, there’s a call for you from Washington, and then Joe Marvin in Houston wants to talk to you, Mister Richardson.”

Red started to get up to let Joyce out into the aisle, but the navigator—a young man in the shiny green nomex flight coveralls and “Air Force” writ-

ten all over him from his bushy moustache to his black laced flight boots—went on, “Where’s Casey Las-kewitz? Somebody wants to talk with him, too.”

Richardson pointed out where Casey was three rows back sitting next to Herb Haynes. Both men were reclined in their seats and dead to the world. Red remarked to the navigator, “Unless the world’s coming apart and Casey’s the only one who can fix it, let him sleep. He’s with NASA Public Affairs, and there isn’t a whole hell of a lot he can report on right now.”

“Okay. I won’t wake him up until you two are finished. Never disturb a guy when he’s logging sack time . . . But his boss in Washington wants to talk with him, and it’s supposed to be urgent.”

“For Casey, it’s always urgent,” Red observed. He thought that maybe Joe Marvin could tell him what the problem was. Ten to one, Red could handle it without having to disturb the PAO man upon whom he was going to be so dependent at Easter Island in keeping the news media off his back and out of the way of the working people.

Up on the flight deck of the Hercules, the navigator motioned Joyce toward the empty jump seat behind the pilot. The constant drone of the big props was somewhat less audible here, but the noise level from the boundary layer of air moving past the nose at 380 miles per hour actually made it noisier.

“Better use this,” the navigator told her and handed her a headset with ear-phones and boom mike attached and a long cord with a push-to-talk switch. “You won’t be able to hear anything

without this. You've got to push this switch to talk. Got it?"

Joyce nodded.

As she suspected, it was Alfred M. Dewey in Washington. The telephone link had been routed from the Space Center through Ellington Air Force Base to the Naval Air Station at Corpus Christi and thence via military UHF link to the Hercules.

In spite of all these interconnections, she could hear her boss quite well. "Miss Fisher, the Chilean government has agreed to permit us to conduct our operations on Isla de Pascua under certain conditions . . ."

"What's it going to cost us, Mister Dewey?" Joyce had been anticipating this. She knew the area very well, and she knew how business of all sorts was conducted in this part of the world. It was an open secret, although it shocked Americans when they first encountered it.

"Miss Fisher," Dewey's voice betrayed the fact that he was somewhat sensitive about the matter, "I don't intend to discuss the details over an open communications line. However, suitable arrangements and accommodations have been made . . ."

"I understand."

"The Embassy in Santiago will be fully briefed on the matter, and our *chargé* there will be coordinating activities with you and the Chilean authorities. As I requested, you're to proceed to Isla de Pascua where you'll be, in effect, our ambassador without portfolio." He went on to explain the full range of conditions that the Chileans had insisted upon.

Joyce shook her head as she listened.

The Chilean government officials knew they had the mighty United States right where they wanted it, and they were exacting the maximum toll possible.

"Provided I can get this matter staffed here in State tomorrow morning when the proper people are here to approve the accommodations and arrangements, I don't anticipate that there'll be any problems in clearing your flight through Santiago to Isla de Pascua or in obtaining whatever's necessary from the Chileans. You're responsible, Miss Fisher, for all United States diplomatic affairs on Pascua, including the necessary protocol for the Chilean inspection commission that will join your flight in Santiago."

"Do I report to our Ambassador in Santiago or to you?" she wanted to know.

"To me, please. I've been given the equally difficult job of handling the matter for State . . . and it looks like we've all got a very busy time ahead of us."

"I guess so. Listen, I need the full details of the arrangements and conditions agreed on. It's quite probable I'll have to slap a few hands that shouldn't be in the till. If I don't monitor it closely and make sure it's done according to agreement, this operation could triple the federal budget."

"The Santiago Embassy will have the full details in a cable that will be there by the time you arrive tomorrow. Tell the NASA head of operations—Reed Richardson, is it?—tell him not toicker prices or costs. That sort of thing is to be referred through the Embassy in Santiago. I'm not just certain whose budget these funds will come out of.

but I've been told we shouldn't worry about it. So we'll let GAO or OMB keep score."

"Mister Dewey, you sound awfully tired . . ."

She could hear the sigh over the headphones all the way from Washington. "It's been a long day, Miss Fisher. And it may be a long night, too."

"I agree. It's been the same for me. How's Nash Sullivan doing in New York?"

"He got there too late today to do much, but we'll be sending a NASA briefing team up to the United Nations to present the full details to those on the Security Council who'll listen."

Joyce sighed. "Sullivan's got his hands full, too."

"Miss Fisher, in addition to that cable waiting for you when you get to Santiago, the *chargé* will have the proper documents ready to take to Isla de Pascua for the crew and for the *Atlantis*."

"Documents?"

"The crew wasn't provided with passports, so the Embassy in Santiago is preparing them and obtaining Chilean visas. And the *Atlantis* didn't carry a Certificate of Airworthiness or the FCC licenses for the radio transmitters aboard as required by international law . . ."

"Good Heavens, that's incredible. Anybody who's done any international travel knows about that. Who's responsible for the oversight?"

"Never mind. It seems there's always been some question regarding whether the Shuttle Orbiter is a spacecraft or an aircraft. The best answer I've been able to get is that back in the early 1970's NASA and the FAA got together

about it, and the FAA didn't have the slightest notion of how to grant a Certificate of Airworthiness to a spacecraft and didn't want to spend the time and effort developing the standards for what was considered to be a single type of specialized vehicle, the Space Shuttle. After all, the previous space capsules didn't have certification. Of course, they didn't have wings, either. It seems a decision was made that the United States would consider the Space Shuttle as a spacecraft . . . but people come and go in the Civil Service, as you know, and apparently nobody bothered to consider all of the international protocol that would be required in a contingency landing. I understand that was a big problem with the entire Shuttle program during its development period: because of a short budget, everyone planned for and counted on a hundred per cent success all the way down the line . . ." Dewey's voice was getting weak now, often disappearing in white noise.

"It's getting difficult to hear you. I'll call you from Panama."

"Very well. I presume I'll be here. Never had to sleep on my office sofa before, but there's always a first time . . ."

"You should try these airlift seats," Joyce remarked. But the connection had gotten so bad by then that she wasn't sure he'd heard her. She stripped off the headset and handed it to the navigator. "Lost him."

"Yeah, we're getting out of range of the Corpus UHF transmitter," the navigator replied.

The Hercules pilot turned and remarked, "Paul, try Selcal or VHF.

Houston wanted to talk to Richardson. There must be some frequency we can get through on . . . "

"Roger. Stand by, Mister Richardson. I'll try on another channel."

They'd been more than two hours in the air on the first five-hour leg to Panama, flying down the east coast of Mexico. Although there was constant radio contact between the Hercules and the Mexican air traffic controllers, working special communications channels through U.S. facilities was a different matter. The navigator and the pilot both set to the task of establishing contact with the Federal Telephone Service through the MAC radio communications system.

Finally, the navigator handed the headset to Red who put it on, adjusted the boom mike, pushed the talk switch, and tentatively said, "Testing, testing, testing . . . "

"That must be Red Richardson. He's always testing," came the voice of Joe Marvin from Houston.

"Are you still on the board there, Joe?" Red wanted to know.

"Yeah, but I'm going to turn it over to the next shift and get some sleep once I pass some hot skinny along to you," Joe Marvin told him. "Listen, the second Herk got off Houston International without a hitch. It's got one of Eastern's low-boy JG75 tugs. And we dug up a satellite ground station for you. It's one of the old ones that was used on the recovery carriers during Apollo. GE and Western Union both volunteered some of their people from here to dust it off, set it up, and operate it. They took it out of storage and we packed it aboard the Herk in place of the runway construction gear which'll be coming

on a fourth Herk that Matt Hubbard managed to find for us. The satellite boys'll get the ground station set up and working for you on Isla de Pascua so you'll have constant communications with us."

"If we have the electrical power to run it. Did anybody think to consider that?" Red wanted to know.

"We may work for Mission Control, but we ain't stupid. Ellington loaned us a 10 KVA generator unit, one of their APU's that's run by a gas turbine and uses JP-4 for fuel . . . and we'll have plenty of that on Pascua. The fourth Herk will leave Ellington tomorrow with a lot of goodies aboard including that APU."

"Good work. Looks like we're going to have to bring in just about everything we need . . . "

"Not quite. Talk to Joyce Fisher. I'm sure her boss in State just gave her the same good news and bad news he passed along to us. Guess what, Red? The Chileans are going to help us!"

"Yeah?"

"Yeah. Whether we want it or not . . . and at our expense."

"Just what I needed. I'm going to have enough trouble handling an American crew under these circumstances. Who the hell saddled me with two crews, neither speaking the other's language?" Red Richardson was upset about this turn of events. "Okay, Joe, make sure that Herk full of goodies has the equivalent of lots of junk jewelry for the natives. Sounds like I'm going to have to buy our way through this . . . "

"According to State, good old Uncle Sam is already paying through the nose

for these 'accommodations.' That's the word that the guy from State used," Marvin's voice came back with a note of disgust in it. "It's cheaper than paying for a new Orbiter. At any rate, I'll stick a lot of goodies in that fourth Herk. But don't go hog wild with them. State says to talk to Joyce about it. She apparently knows her way around down there."

"I'll do that. But tell State this is my show, and it's my responsibility to get the *Atlantis* off Easter Island as fast as possible. I'm not going to put up with any *manana* stuff from the Chileans. Make sure State understands it too. The first time the Chilean helpers get in the way, they're off the job . . ."

"Uh, okay, but better work through Joyce Fisher. According to the man from State, that's why she's there, Red. And she's apparently got the full delegated authority from State to act in the interests of the United States."

"I'll talk to her about it, Joe, but this job can have only one boss . . . and that's me!"

He'd known from the start this was going to be a difficult job involving the interplay of two cultures. But Red Richardson was beginning to realize this interplay was getting more complicated by the minute.

"Comrade, the Chilean government has acceded to the American request to recover their spacecraft in spite of our efforts at the U.N. and in Santiago."

"Do you think I am not aware of that? Since the junta took power and installed lackeys of the imperialistic capitalists in government positions, the usual greed of capitalism overcame rev-

olutionary fervor."

"Our agent on Pascua informs us he will act when the time is right."

"I do not intend to depend on that. We have detached the *Kharkov* and the *Sverdlov* from the Vladivostok command and ordered them to the vicinity of Isla de Pascua. A show of force in the area will do much to deter any American plans to establish their base on Pascua."

"And it will also cover well for the other operation."

"*Da*, a diversion may be necessary if the Americans dispatch naval forces to the area in response to our move . . ."

"Casey, sorry to bother you in the middle of the night." Roger Service's voice from Washington was not quite conciliatory over the long telephone plus radio link to the *Hercules* cruising southeastward beyond Yucatan. "But I've got a problem here, and you've handled it in the past . . ."

"What's up, Roger?" Casey had a foul taste in his mouth. In spite of the Air Force coffee—which never managed to measure up to the Navy coffee, especially on MAC flights—he'd been sleeping deeply, lulled by the constant throb of the Herk's turboprops. He wasn't sure he was awake, and he tried to drag his brain up out of the cotton pit of exhaustion in order to talk intelligently to his boss.

"It's Marty Soloman . . ."

"Oh? What's Marty Baby want this time?" Casey replied caustically.

"He's madder than hell he wasn't included in the initial team to Easter Island with you . . ."

"Look, Roger, Herb Haynes is the pool reporter for the initial segment. That was agreed by the Washington bureaus of all the wire services and networks," Casey explained.

"He won't buy it. He knows Alice Arnold's with you."

"How come you saddled me with Alice Arnold anyway, Roger?"

"She knows where all the bodies are buried."

"Who and where?"

"How can I put it? Basically, she knows who's doing what to who and who's getting paid for it over in the Executive Office Building. I had two options. One, I could've let her turn the thumb screws at sixteen hundred Pennsylvania, whereupon there would've been calls to the Administrator that might have made the Administrator upset. Or, two, I could get her aboard because she's a woman; Jackie Hart's mission specialist on this flight, and I was simply responding to the latest directive about equal opportunity news coverage. You might say I did it so Alice could cover the woman's angle."

"Okay, I'll buy that. What else can I do?"

"What do I do about Marty?"

"Get him on the Pan Am press charter, and I'll take care of his tantrums once I get him on Easter Island a couple of thousand miles away from network headquarters," Casey explained.

"He wants to bring his own cameraman, and he demands time on the satellite link."

"Good old Marty Baby. Tell him sure. Give him what he wants as long as he's in New York with immediate access to the network. Once he gets to

Easter Island, it's a different matter . . ."

God damn it! Casey thought as he took off the headset after the conversation ended. *Am I going to have to hold his little hand all the way from Easter Island?* Well, it was either that or let Roger Service screw up four years of careful bridge building to the right people in the media, people who'd give the Shuttle the right sort of coverage, thanks to Casey Laskewitz.

At that point, he was beginning to wish he'd stayed in Washington to handle things from there. But the contingency landing plans stipulated he was the first to go to wherever an Orbiter had made a contingency landing. He wondered why he hadn't had the foresight to somehow insist home base be adequately covered by someone of his choice whom he'd trained. Why had he been so stupid to forget that Roger Service would be the one sitting on home plate and fretting, possibly even messing up forever the careful structure of relationships built by Casey Laskewitz?

"How we doin'?" he asked the pilot, peering out at the darkness beyond the red-lit instrument panel and the windshield.

"Oh, another nine-five minutes and we should be starting to let down for Panama," the pilot replied with a bored professionalism.

"About a five hour flight, then?"

"Yup."

"How much total time to Santiago?"

The pilot riffled through the papers of his flight planning documents. "We figure about fifteen hours total, not counting ground time and if the winds hold the way they are."

Jeez, that's forever and a day! he thought. Service couldn't hold off the media that long, much less the additional time it'd take to fly the 2000 miles from Santiago to Easter Island. He'd have to write some sort of release about this initial phase of the rescue flight and dispatch it from Panama when they landed. And he figured he'd have to do the same for both Lima and Santiago. That meant he'd better get busy. No typewriter, so he'd have to do it the hard way: longhand on a paper tablet. *Damn! Should have brought a typewriter!* he told himself savagely. Why hadn't he remembered a simple thing like a typewriter? Well, maybe he could "borrow" one from somebody in Panama with a promise to return it on his way back from Easter Island at some indeterminate time months in the future when this was finally all packed in and wrapped up.

In the meantime, the interplay between cultures was getting along just fine on Rapa Nui.

It was, Frank reflected through a slightly alcoholic haze created by something Captain Ernesto Obregón had brought along, one hell of a good party.

A full moon had risen over Rapa Nui in an absolutely clear sky. The southeast trade wind wafted across the island, blowing out to sea the smoke from the multitude of fires. The brilliant light of the moon actually threw shadows from the volcanic cones of Rano Roi and Rano Kao. And, standing enigmatically on the crest of the hill to the north as if watching yet another incursion of strange peoples meet the unearthly surroundings of Rapa Nui, the Island at the

Center of the World, were the *moai*, the huge stone statues.

Yet another clan of terrestrial people had come to the Center of the World.

Like many Americans, Frank had never eaten mutton. At first taste, it seemed greasy and fatty. But, cooked as the Pascuans did it with the heat from volcanic rocks warmed by flames from burning *titora*, it was a delicious if different taste.

Frank suddenly realized he hadn't had anything to eat since the pre-launch breakfast back at Vandenberg that morning. At the moment, it seemed like a long time ago. And it had been in a totally different world. The food tasted good, even if it wasn't something he was used to. And he found himself unwinding from the events of the day, including the incredible stress of landing the *Atlantis* on Mataverí with no landing aid other than a simple VOR station. It had hyped him up considerably. The adrenalin was still flowing through his system, and he felt horny the way he always had when returning from a combat mission with lots of SAMS and MIGS and flak. But he remembered what Obregón had told him, and he held himself in check as he'd learned to do at Bien Hoa and other far away places where the women were either off limits or looked like one of his daughters. Nevertheless, he began to feel pretty good.

Obregón was feeling good, too. It was obvious to the Shuttle pilot that the military governor was under the sort of stress that was unusual for his culture. He was the military governor, the man in charge, trying to run this tiny, isolated island under rules and regulations



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not only decades old but often created by his own government bureaucrats in Santiago who'd never been to Isla de Pascua.

But Obregón's early education had been in the United States at various military schools, and he'd picked up ideas and concepts that were alien to what he had to do as the military governor of Isla de Pascua.

As a result, a lot of rules and regulations went by the boards that night because Americans were on the island . . . and Obregón felt at home with Americans. It was patently obvious to Frank that Obregón deliberately turned his back several times on several quiet infractions of the rules he'd laid out to the Shuttle crew earlier.

The military governor took quite a few belts from the bottle during the evening, but he never got to the point where he began to act drunk. His very professional, businesslike manner mellowed considerably, however, and he became increasingly convivial. "You don't know what a pleasure it is, Colonel, to be able to hold a conversation with an educated military man such as yourself," Obregón confided to Frank. "We get many scientists and tourists in here, but seldom any military men except my fellow naval officers on the ship that comes once each year."

"Uh, Governor," Frank replied cautiously, "in my capacity as commander of the *Atlantis*, which is a spacecraft of our nation's civilian space agency, I'd prefer my military rank not be used. As a matter of fact, may I ask how you learned of it?"

"I listened when the reporters were questioning you on the radio from

Houston. And I suspect that Lewis Clay was also a military pilot before joining your space agency. However, even though your Air Force now has women pilots, I don't imagine that Señorita Hart is one of them. With no insult intended to the Señorita, she doesn't exhibit the knowledge of military courtesy one *always* finds among professionals such as ourselves the world over . . . "

"You're a very astute observer, Governor."

Obregón unscrewed the cap from the bottle and poured some into Frank's now-empty cup. "Since you object to the use of your rank, perhaps we should dispense with such protocol altogether. We'll undoubtedly be working closely together in the weeks to come. The use of titles should probably be continued in public, of course. But between men of similar responsibilities and backgrounds, the use of titles to convey respect can be cumbersome in private conversations and dealings. I'm aware of American ways, and I like the informality among you that signifies basic respect for one another as competent individuals." He filled his own cup, screwed the top back on the bottle, and looked directly at Frank. "I'd be pleased if you'd know me as Ernesto . . . "

Frank looked him straight in the eye, also. The two of them were oblivious to the raucous party around them, to the throb of drums, to the spontaneous dancing that was going on in the light of the *titora* fires. "What did they call you when you were going to school in America?"

Obregón laughed. "At VMI, my nickname was 'Chili-dog!' "

Frank guffawed and raised his glass.

"Well, here's to Chili-dog . . . but I'll call you Ernesto."

The military governor raised his glass to the Shuttle pilot. "And here's to Colonel King . . . Frank."

"I'll drink to that."

It wasn't realized until much later how very important that hula on the night of the arrival of the *Atlantis* was.

Some sociologist might ponder over its implications years later during the preparation of a thesis on the social implications of Shuttle Down, but right then it was smoothing off a lot of rough edges between two groups of people who were culturally as different as night and day.

Hap had been talked into getting shakily to his feet and dancing with an attractive Pascuán girl. She was trying to get Hap to hula, but the NASA payload specialist would have none of it. He started to teach her to disco to the beat of the drums. It was good disco on Hap's part; he knew what he was doing. After watching Hap for a few minutes, the Chilean naval personnel caught the spirit of the thing. As for the Pascuans, they treated it like one of their native dances, adding their own unique motions and steps to what Hap was doing in his bare feet with his white nomex NASA coveralls rolled up to his knees.

A combination of Polynesian hula and American disco turned out to be a wild and unusual dance combination.

"How about that, Jackie?" Lew asked as the two of them watched, sitting side by side on the reed mat that was their place of honor that evening. "What to give it a try?"

"Why don't you cut in on Hap?" she wanted to know.

"Well, let's not create any problems," Lew replied smoothly, realizing for the first time from that remark that Jackie probably had the world's greatest inferiority complex not only because of all the woman's lib beliefs she held but because she was competing with a lot of very good male pilots and mission specialists. He began to understand her for the first time. "I'm taking to heart what the military governor said we shouldn't do . . ."

"I didn't think you'd pay any attention to the warning about the women, Lew."

Lew laughed. "Jackie, don't worry about it. They don't know about Lew Clay, hot pilot, yet. But I think Frank was worried about you and the Pascuan men, although Obregón didn't say anything about *that*."

Jackie looked out at the dancing forms. "Hadn't entered my mind, but now that you mention it, he didn't say anything about the men . . . And some of them are attractive . . ."

"What have they got that I haven't got?"

"I don't know. What've you got?"

"Come on, let's dance. Maybe you'll find out."

"All right, I've never really gotten to know any Navy brown shoe types."

"No shoes tonight. Come on, take off those flight boots, Jackie. You figure we'll ever have another opportunity to dance barefoot in the sand on a south sea island with no communications and no boss to look over our shoulders?" Lew was rapidly shucking his boots and rolling up his flight coverall legs.

"You know," Jackie said, pausing to think about it, "you're right. And

judging from what Hot Pilot King's drinking over there with Obregon, neither of them give a damn tonight, either." She not only pulled off her flight boots and rolled up her coverall legs, but she also rolled up her coverall sleeves and zipped down the front of the coveralls quite a good deal more than she'd normally have done even in a disco along NASA Road One.

Lew obviously noticed. "What, no NASA issue lingerie?"

"Listen, when you fall outside the ninety percentile standard that all NASA stuff is designed for, it's too damned tight," the mission specialist told him, bouncing to her feet. "One of my ambitions is to design decent space flight fashions for women." She began to move to the music.

Obviously, the whole crew of the *Atlantis* was reacting to the release of the incredible tension of the day with the same physiological reactions albeit with very individual ways of releasing that tension.

Jackie may have been as hard as nails to some and able to whip her weight in wildcats, but Lew noticed for the first time—why hadn't he seen it earlier?—that Jackie was basically all female and probably capable of about Mach Three. He decided then and there he'd paid too much attention to the stories in the Astronaut Office and damned himself for placing too much credence in them. He got to his feet and began to move to the rhythm of the drums.

A time and a place like this might not come along for quite a while, he told himself.

It was apparent that Jackie was thinking the same thing.

And it might be a very good time to check out those rumors.

As for Jackie, she'd heard the rumors about Lew Clay, too . . . and about Navy pilots in general. She became anxious to check the data for herself as well.

The two of them didn't dance very long. They didn't have to.

Nobody noticed the two of them walking slowly up the hill toward the seven huge statues, their arms around one another and their white coveralls gleaming in the bright moonlight. There were other couples who were doing the same thing. In this time and place, nobody cared.

They disappeared into the deep shadows at the base of the enigmatic statues.

To an outside observer from another planet, it might have been a strange sight. In the bright light of a full moon in a cloudless sky—a moon once walked by humans and awaiting the next booted imprint on its ancient surface—the black and white shape of the Space Shuttle *Atlantis* sat quietly on the runway while only a few miles away near seven huge stone statues with impassive faces that perhaps guarded the secret of their ancient source, a group of humans danced and cavorted and ate and drank by the flickering light of fires and made love to one another with joy and pleasure as human beings had done for millions of years.

Not even the four space farers in their shimmering white flight suits could help being caught up and lost in the ancient celebration of people coming together to enjoy each other because, in spite of themselves and what they were trained to do, they were humans, too.

Analog Science Fiction/Science Fact

When the sun rose again over the western hemisphere the day after the Space Shuttle *Atlantis* lifted off from Vandenberg Air Force Base, some people already had their lives changed beyond their wildest imaginings of twenty-four hours before. And some didn't know it yet.

Alfred M. Dewey rose from the sofa in his office where he'd spent the night after long telephone conversations with many people. For the first time in his life, he watched the sun rise over Washington, D.C.

Because the west coast of South America is an hour ahead of Washington's time, sunrise came earlier to the flight of three Air Force C-130 Hercules transport planes winging their way southeastward. Red Richardson was awakened from a fitful slumber as the light from the rising sun poured through one of the three small portholes on the left side of the plane, making columns of brilliance through the otherwise darkened cargo hold. Lima, Peru was now behind them. Fatigued as he was, he was still running on the momentum of the previous day which, with the landings in Panama and Lima in the middle of the night, hadn't really been separated from this morning by the usual night of sleep. He went to the john, decided it was useless to try to shave in the cramped and spartan facilities of the cargo plane's single tiny lavatory, and elected to clamber up to the flight deck so he wouldn't disturb Joyce who was still blissfully sound asleep in the reclined seat. Thinking of the crew, he grabbed one of the stainless steel ther-

mos bottles of coffee that had been refilled in Panama.

The flight crew was still on station, but Red could see that fatigue was beginning to show on their faces. Each man exhibited the dull and emotionless expression that betrayed the face that each of them had managed to catch catnaps as the Herk flew on autopilot.

Red waved the thermos. "Coffee?"

The pilot stretched, fumbled for the paper cup in the holder on his left, and remarked. "For the dawn patrol, always. Thanks. Chuck, you'd better go to the john first," he told his co-pilot. "I'll check it out after you come back."

The co-pilot indicated his cup to Red. "Fill 'er up, and thanks. It'll be cool enough for me by the time I get back." He crawled out of the right seat—cargo planes are not built for easy access to the crew stations, either—and disappeared down the ladder into the darkness of the cargo hold.

Making a minute adjustment to one of the multitude of controls on his panel, the flight engineer told Red, "Thanks. I've got some hot tea. Can't take coffee. My system confuses caffeine with uric acid, and I can't always leave my post . . ."

The pilot chuckled and sipped the hot coffee Red had poured. "Santiago about sixteen hundred Zulu Time," he remarked. "Noon local."

"Long flight. Will you be able to get some rest in Santiago before that long haul to Pascua?" Red asked, worried that the critical flight crew might become over-tired and therefore accident-prone.

"I'll hack the six-hour flight to Pascua okay if I can get a good hot meal

and spend an hour or so in peace and quiet walking around," the pilot told him. "It's an over-water flight. The navigator's the one who sweats that leg . . ."

"We've got to get to Pascua fast with this propellant handling equipment," Red explained, perhaps unnecessarily. "That Orbiter's loaded with nitrogen tetroxide . . ."

"How much room on that runway with the Shuttle on it, too?"

"The *Atlantis* rolled out about eight hundred feet from the end of a runway almost nine thousand feet long and a hundred wide . . ."

"No sweat," the pilot said with a grin. "We can drop this bird in fully loaded on an eight hundred foot strip. Uh, Pete, see what they put aboard in the way of breakfast for us, will you?" he asked his flight engineer.

That same sun rising a little later over the volcanic cones of Rapa Nui struck Frank squarely in the face as it streamed through the windows of the Hotel Rangaroa. He rolled over and tried to bury his head in the pillow. It was no use. So he sat up . . . and wished he hadn't.

Damn, that had been a good party! Too good. He should have known better than to try to stay drink for drink with Ernesto. Whatever the military governor'd had in the bottle was good, but it'd also been potent.

His tongue was asleep . . . and his teeth itched.

No, he decided, his teeth had sweaters on them instead.

He didn't recall when the party had broken up. He hadn't looked at his watch. He remembered trying to find

Lew and Jackie, and he recalled trying to get Hap into the jeep. And there was a vague recollection of a somewhat wild ride over a very rugged road with Ernesto and him driving by the committee system—Ernesto steering by reference to the left side of the road and counting on Frank to keep track of the other side.

Well, he thought as he looked out over the little village of Hangaroa and the sparse volcanic landscape of Rapa Nui, he might have time to get shaped up before the first C-5's landed later in the day.

Then he remembered that the *Atlantis* was still sitting on the Mataverí runway. No C-5 Galaxy could land safely with the *Atlantis* there. What would they try to do? Although he found it difficult to make the simple mental calculations, he figured that nobody would show up at least until much later than evening. Maybe Obregón's men could get the radio transmitter on the air so he could talk to Red Richardson, if Red had made it to Santiago yet.

That would give Frank time to recover from last night. Red would understand. But Frank didn't know who else would be coming. Sometimes the non-flying side of NASA didn't understand the flying side. Well, the guys with the pocket calculators would never have to land an Orbiter without the microwave landing system, so to hell with what they thought.

He managed to wash and shave with what he could find in the personal survival kit. Quite obviously, the one-shot disposable razor had been obtained from the lowest bidder. And the shaving cream in its little plastic baggie wouldn't lather in the hard water.

Naturally, the survival kit contained nothing for a hangover, just four aspirin. Was NASA telling him, in effect, to take four aspirin and they'd call him in a few days?

Even in his current physical condition, he couldn't help grinning as he thought about it. Two of the aspirin would help . . . some. At least, they'd keep him from dying for a few hours anyway. Beyond that, who could tell . . . ?

Breakfast would help, and he hoped that José Hey had a decent kitchen, a good cook, and something more than *taro* to eat.

He remembered where Hap's room was because he'd poured the payload specialist into it in the middle of the night. His sharp knock on the door brought a reply that was a moan, "Go 'way and lemme die in peace."

It was the sort of response Frank expected, but the tone of Hap's voice was wrong. In fact, it sounded like the payload specialist was indeed dying. Frank opened the door to see Hap curled up in a fetal position on the bed, holding his stomach with his arms and sweating profusely.

"Come on, Hap, you'll feel better if you get up and get some food into you," Frank began.

"Like hell! I've been sicker than a dog for the last couple of hours. I've got a god-awful pain in my belly, and I've vomited everything that's in me, and I've been running to the crapper like there was no end to it . . ." The payload specialist groaned. "Whatever I ate last night . . . Boy, it sure got to me."

Frank walked over to the bed and laid

his hand against Hap's sweating forehead. "Hap, you're running a hellacious fever. Let me see if I can find that doctor . . ."

José Hey came running when Frank walked through the lobby-patio of the hotel calling for him. The Mayor of Hangaroa looked rather pale, but seemed to have survived the party in better shape than the Shuttle pilot. And he managed to produce Doctor Esteban within ten minutes.

"Nothing very unusual. I see it occasionally here on Rapa Nui. Bacillary dysentery," was the Doctor's immediate diagnosis.

"I didn't think there was any of that left!" Frank exclaimed. "How come I don't have it? Hap, did you eat anything some Pascuan offered you that I didn't get offered, too?"

"I don't know . . . I don't know . . . I ate the mutton and the *taro* and all with the rest of you . . ."

"What did you drink, Señor Hazard?" Doctor Esteban asked.

"The stuff Obregón had . . . And you had something, too. While we were dancing, Marina Kehu gave me some kind of real potent stuff they make from goat's milk . . ."

Doctor Esteban sighed. "We have outbreaks of dysentery from time to time on Rapa Nui. Most of us have natural immunity to the majority of the bacteria that cause it. The bacteria can come from milk products. Señor Hazard obviously has no resistance to the particular bacterial strain that's causing his dysentery."

"What's the diagnosis, Doc?" Hazard managed to groan. "Am I gonna die like I think I'm gonna?"

"You very well may . . ."

"Are you serious, Doctor?" Frank wanted to know.

"I wish I were not. I'll try to find out whether it's the Shiga or Flexner-Harris strain, although the Shiga type is most common on Rapa Nui. I hope that it is indeed only dysentery and not amebiasis or cholera, which would be even more serious," Esteban remarked with some concern evident in his voice for the first time. It was obvious that, with his education and training in Central and South America, this medical man had seen such diseases far more often than any American doctor. "I will start Señor Hazard on sulfadiazine immediately. But I will also have to see the Governor. We may have to get some of the other sulfa drugs flown in from Santiago if he does not respond to the sulfadiazine. Perhaps some streptomycin or chloromycetin can be flown in as well in case he develops granulocytopenia as a result of sulfa therapy. And I'll want to check that fermented drink . . . if I can find Marina and if she has any of it left . . . I don't want to have an epidemic of dysentery on my hands . . ."

"You implied the possibility of dying from this, Doctor. How real is that possibility?" Frank pressed.

"Highly probable without treatment. The biggest problem is dehydration and an imbalance of electrolytes because he's not only sweating, but passing fluids almost constantly. There is also the problem of the exotoxins of the bacteria, and this is usually very painful, often leading to delirium. If therapy is delayed, it can be fatal within three to four days because of both dehydration

and intoxication," Esteban explained. "I'll have Captain Obregón get in touch with Santiago. In the meantime, we must force fluids." He shook his head. "It would help greatly if I had some antibiotic . . ."

Frank knew he had to do something or possibly lose Hap Hazard, Doctor Esteban and all the experience he possessed notwithstanding. "We'd better see Captain Obregón at once, Doctor. Then I'll go back to the *Atlantis* and see what we have in the medical kit aboard. Certainly it must have something in it that'll make him more comfortable, and it may contain both antibiotics and diarrhea medicine." It didn't make any difference to him now whether or not there was still nitrogen tetroxide aboard the *Atlantis*. He knew he had to risk getting the medical kit out at all costs.

It would be inexcusable to lose a Space Shuttle payload specialist to a disease that's been a common scourge of the human race for eons and which, in the modern world, was considered to be a primitive affliction no longer of great importance.

It was certainly of great importance to Hap Hazard.

He banged on Lew's door. "Roust it out, buddy. We've got work to do."

"Ahwrr," came a muffled growl.

Frank opened the door, strode over to his co-pilot's bed, and dumped him unceremoniously on the floor. "Get up. Hap's sick and may damned well die. Get dressed. We're going out to the *Atlantis*."

Lew shook his head. He hadn't bothered to undress before climbing into bed. "What the hell are you talking about?"

"Just what I said. Get up and put your shoes on. We've got to get the medical kit out of the *Atlantis*."

Without another word, he strode out and down the hall to Jackie's room. Again, he pounded on the door.

"Just a moment," Jackie's voice replied, and Frank could hear noises in the room. Then the door opened, and Jackie peeked through. She was still wearing her flight coveralls. "Frank, the world must be coming to an end or you're living damned dangerously, waking me up under these conditions, especially after . . ."

"Put it all together, Jackie," Frank told her. "We've got a very sick Hap Hazard. Dysentery."

Jackie's expression changed immediately, and she became all business again. "What can I do, Frank?"

"Go hold his hand, do what Doctor Esteban tells you, and keep forcing fluids to him until Lew and I get back from the *Atlantis* with the medical kit."

"In other words, you need a nurse?"

"I don't. Hap does. And he may die if we don't get that medical kit and if somebody doesn't give Doc Esteban a hand with Hap . . ."

One thing Frank could certainly say about Jackie: she might be rough as a cob, but when the chips were down she could be counted on.

He collected up Lew on his way back down the hall. The co-pilot hadn't shaved, but that could wait. "Where are your boots?" Frank asked.

Lew looked down at his rolled-up coverall legs and bare feet. "Damned if I know. I took them off last night at the hula."

"You'll probably never see them

again," Frank guessed, remembering what Obregón had told them about the Pascuan lack of property respect. "Some Pascuan's sporting a pair of NASA-issue space shuttle crew boots today, maybe the first shoes he's ever had. Never mind, buddy. You'll just have to go barefoot. Let's find Obregón."

The military governor, dressed in a clean set of khakis with an immaculate, razor-sharp press to them, was having breakfast in his quarters with Father Francisco when the two Shuttle pilots arrived. Upon hearing Frank's report, Obregón nodded and said, "I'll be in touch with Santiago as quickly as I can get to the radio station."

"Can Lew and I borrow the jeep to go out to the *Atlantis* after we drop you at the radio shack?"

Frank almost didn't have to ask.

"I will go to the Hotel Hangaroa and see if there is anything that I may do to help Doctor Esteban and Señor Hazard," Father Francisco remarked as they parted. "I may not be a doctor, but perhaps I can help in other ways . . ."

Both pilots were extremely cautious as they drove slowly up the runway toward the *Atlantis*. Her tail with its rocket nozzles faced them, but there was no way they could tell whether or not there were nitrogen tetroxide vapors around her. Fortunately, the breeze was very light this morning and blowing gently out of the northwest. That would help carry any fumes away from them as they approached, Frank thought.

"See anything?" Lew asked, peering at the tail section as they drove slowly up.

"No. OMS pods look okay to me. In fact, there doesn't seem to be any-

thing obviously wrong with her," Frank remarked, looking closely at the *Atlantis*.

"Except she quit working on us," Lew pointed out. "Wonder what happen?"

"We'll leave that for later. Look, I'll drive us around and park under the hatch. You stay with the jeep. I'll go aboard and get the medical kit. If you hear me yell to get out of here, go . . . and don't wait for me. Understand?" Frank told him.

"Not leaving without you," Lew said flatly.

"If I say so, you will," Frank told him.

They stopped underneath the open hatch with Jackie's rope ladder dangling from it. After Frank turned the jeep's motor off, there was no sound except the sighing of the wind. The *Atlantis* was quiet, with none of the creaking and groaning of the day before. She'd settled down overnight, all her structure stabilizing at ambient temperature.

"Nothing wrong with this bird," Lew pointed out. "I'll go aboard with you."

"Think you can climb that rope ladder in your bare feet?" Frank wanted to know.

"Uh . . . I'll wait for you." The co-pilot was already having trouble walking barefoot. Like most Americans, he's always worn shoes, and his feet were not tough enough to walk over sharp stones or even pea gravel without discomfort.

Climbing a rope ladder was not the easiest thing in the world to do. Frank decided. He was out of breath by the time he pulled himself over the lip of

the open hatch. He wasn't out of shape but was still recovering from the night before.

The mid-deck was dark except for where light came through the open hatch. However, as his eyes grew accustomed to the lack of light, he began to see better.

There was still the possibility of toxic fumes, and he kept checking himself for the initial symptoms of nitrogen tetroxide inhalation as he began to open and empty lockers on the forward bulkhead. As he dropped the first load out the hatch and into the waiting arms of his co-pilot, he remarked, "Lew, I think we're okay on the OMS propellant. As long as we're here, I'm going to off-load our personal equipment lockers and most of the food on board. And I need some clean socks and shorts . . ."

However, it was with relief that he clambered back down the rope ladder after removing all that he felt would be important to them. Once back on the runway, he rummaged through the equipment and found the medical kit. A quick check of the contents list produced a shout of joy from the Shuttle pilot. "Hot damn! Sixty tetracycline capsules. Twelve dramamine pills. Twenty-four diarrhea pills. And even pain-killers."

"Let's get the hell out of here," Lew observed. "You'll probably think I'm growing a set of chicken feathers, but I'm pretty damned leery about being around this beast as long as she's still got propellants in her. I'm a rather devout coward at heart." As a Navy pilot, Lew had been thoroughly indoctrinated about the hazards of jet fuel and other fuels shipboard on carriers. He never

really liked having to ride atop several million gallons of liquid oxygen, liquid hydrogen, nitrogen tetroxide, and monomethylhydrazine in the Shuttle missions. But it was part of the most exciting flying job in the world, and he was willing to compromise with the hazards in normal flight operations. He wasn't so sure he was willing to cope with those hazards in the emergency situation they'd found themselves.

As they drove off down the runway from the *Atlantis*, Frank was relieved. He knew that approaching and entering the *Atlantis* at this point had perhaps been foolish, but he'd done it because one of his crew might not survive if he hadn't.

Hap Hazard now had a fighting chance.

Things were not proceeding well in Santiago.

"The prime minister's office has informed me that the Chilean inspection commission will not be ready to go to Isla de Pascua for perhaps another forty-eight hours, Mister Richardson." The American *chargé d'affaires* Art Phillips hung up the telephone with a note of frustration in his voice.

"Forty-eight hours?" Red Richardson exploded in exasperation. "Look, the *Atlantis* is sitting out there with nitrogen tetroxide in her. It could endanger the entire populace of Pascua. And in two days, there'll be so many military transport aircraft stacked up here in Santiago that there won't be ramp space at the airport for them." This was the final straw as far as he was concerned. He wasn't really rested after the long flight to Santiago, and there'd been some mix-

up in visas at the Santiago airport that had created further confusion. Somebody hadn't gotten the word. And the traffic getting in from the airport to the American Embassy had been atrocious with many detours through back streets because of the new airport expressway under construction. Now, at the American Embassy, more roadblocks were appearing.

"Is the Chilean government fully aware of the potential hazards here?" Joyce Fisher wanted to know. "Are they aware that a delay could be dangerous?"

"Miss Fisher," the *chargé* replied with a sigh, thinking that this young woman from Washington certainly didn't understand the situation in South American countries in spite of the fact that she apparently worked the technical desk for the region. "Things don't move as quickly down here. It takes time to get things done. I've expressed all these concerns to the prime minister's secretary . . . and that's as far as I can go right now."

"Art, who's the prime minister's secretary?" Joyce snapped.

The *chargé's* eyebrows went up at this question. "Why Señor Carlos Acuirre . . ."

"I thought so," Joyce replied with a smile and reached for the telephone on the *chargé's* desk, asking rhetorically, "Art, may I use your telephone, please?"

Joyce dialled a number. The *chargé* merely looked on with astonishment. Nobody from Washington had ever reacted this way before.

She talked in rapid, fluent Spanish to the listener on the other end, finally

saying gaily, "Carlos? Joyce Fisher. *Que pasa, amigo?*" And then she went on, obviously talking to someone she knew very well. Red didn't understand a word, but the *chargé* seemed extremely distressed and surprised at the same time because he understood everything Joyce was saying.

Finally, she hung up and told the *chargé*, "Art, our three Herks are cleared to go to Pascua as soon as we can lift off. The fuelling problem's also been worked out . . . or will be by the time we get back to the airport. And the Chilean commission will be happy to join the press group on the Pan Am charter. When's that coming, Red?"

"Uh . . . should be lifting off Houston this morning," Richardson replied, trying to keep things all straight in his mind. So many details! He knew he'd have to get some sort of office set up on Pascua, maybe even work out a schedule board to keep track of everything.

"Good. Carlos said the commission would rather ride comfortably in a commercial jet anyway. That Herk was designed for cargo and soldiers . . . not people," Joyce said.

"Uh, Miss Fisher," the amazed *chargé* asked in tentative tones, "I didn't realize you knew Señor Aquirre . . ."

Joyce smiled. "Art, I grew up in this Embassy. I probably know more secret passages and rooms than you do. Carlos Aquirre and I went to school together. In fact, he was my first date . . ." She suddenly became all business. "Art, please don't stand still for any delays in this operation. It's too important to the United States and Chile. The Chil-

ean government's talking plenty of cut. Carlos Aquirre knows I'm here and will be on Pascua, and he knows I know the system. And I know a lot about him, too. If you run into any more trouble, call me on Pascua. Otherwise, follow through to the letter on the agreements spelled out in this cable from Dewey." She indicated the teletype flimsy in her hand. Thinking a moment, she smiled again knowingly. "Carlos is such a nice guy. I'll have to stop and see him on my way back once this thing is over. It's been a few years . . ."

Red was feeling better. In the first place, he was beginning to have a full measure of respect for this dark, attractive young woman with hints of Latin background in her eyes and dark hair. She was obviously going to be more than just a pretty face and another bureaucrat under foot. "Still the only way to get things done, isn't it?"

"Beg pardon?" she asked.

"It's still who you know, not what you know."

Joyce shook her head. "No, not entirely. I know some things about Carlos that he'd just as soon forget . . . He knows it too, and that helps when it comes to getting things done. And he expects to see me only after we get this job done on Pascua . . ." And she let it drop at that.

"I was beginning to work out options for staging the operation out of Lima," Red remarked.

"Oh, we couldn't do that," Joyce replied, shaking her head. "That would be an insult of major proportions to Chile, and we'd have to handle the Peruvians . . . and I don't have that many friends up there . . ."

"Uh. Joyce, just how *friendly* are you with these Chileans?" Red suddenly wanted to know for a reason he couldn't have explained at the moment.

"Mister Richardson," she rebuked him softly, "that's *my* business. But, lest you evaluate it by current American moral standards, let me point out that here they're not only quite different . . . but more strict as well . . . at least in the area you're thinking about. I never went on a date with Carlos without a *duenna*."

"Forget it. My parochialism's showing. Let's get moving."

The now-respectful *chargé* arranged for an embassy car to return them to the airport, and the two of them arrived to find Casey engaged in an argument of massive sound level with Alice Arnold.

"Look, Alice, I'm sorry, but I can't help you," Casey was telling her in a voice that was barely under control. He, too, was suffering from the lack of a good night's sleep on the Herk.

And, obviously, so was Alice Arnold. "But I've got to file a story!" the strident female newswoman—as she entitled herself—complained loudly. "The lousy damned telephone system in this dirty, backward, out-of-the-way country tells me it'll be three hours to get through to the States! Circuits are all busy, they tell me. Hell, I don't speak the language, and half the time I can't make myself understood to the operators. Least you could do is get somebody to set up a direct press line for myself and Herb . . . but I get to use it first!"

"Why don't you call your bureau here or get your stringer on the line? File your story through your normal AP

channels?" Casey wanted to know.

"How do I know they'll do it under my by-line? These foreign bureaus can't be trusted, especially in these backward Third World countries. As for contacting a stringer, forget it. He'll want a dual by-line for filing it."

"Careful, Alice, you're standing right in the middle of one of those backward Third World countries you're criticizing," Casey tried to point out.

"So? I've got my press card."

"Just be thankful Chile's still honoring a reasonable freedom of the press on an international basis," Casey said, "because you're drawing a lot of attention from a couple of men over there by the stairway that have 'security police' written all over them . . ."

At that point, Joyce stepped into the exchange. "Alice, look, please cool it. Those *are* security police. Casey, can I help out here? I speak the language." When Casey nodded in obvious relief, Joyce went on. "Come on, Alice, let's find a telephone. I'll see what I can do to talk the operator into getting a call through right away."

"Hi, there! It's Top Of The Morning to you! Back again for our second hour on this busy news day. Settle back with that second cup of coffee before you go off to work because here's the top stories in the morning's news . . . the happenings around the world that may affect everybody today, plus those juicy little tidbits that make for interesting talk."

America's Number One early morning TV talk show host riffled through his papers and went on with the news as he saw it, "Well, NASA still has its

problems. The space agency hasn't managed to get its people down to Easter Island to rescue the Space Shuttle *Atlantis* and its crew of four. NASA spokesman Roger Service told us in a late night briefing that there's absolutely no danger of rocket propellants leaking out of the *Atlantis* and poisoning the twelve hundred people of Easter Island. Apparently, the Shuttle commander, astronaut Frank King, reported by radio that he's detected no leaks. But the big question remains: Why did NASA design a space ship that uses poisonous rocket fuel? Why didn't other government agencies who're responsible for environmental safety step in and insist that NASA use a fuel that was safe, especially if there happened to be an explosion on the launch pad that could spray poisonous fumes onto innocent spectators?

"In the meantime, the United States government continues to deny the claims of the Soviet Union that the *Atlantis* is a military space vehicle carrying a death ray satellite capable of zapping Earth targets with deadly radiation. America's U.N. Ambassador has arranged for a full technical briefing of the U.N. Security Council by experts from the space agency at noon, and this network will summarize what's said on the evening news. However, the Soviet Union has already indicated that they won't listen to the fabricated stories of the American space experts. Special American State Department technology expert, Nash Sullivan, told me by telephone just minutes ago that the space agency will make available to the public the full details of the cargo—which is supposed to be an Earth-viewing satellite called 'Land-

sat-XIII.' Our own network science experts will have a look at these. Is America's civilian space agency working in cahoots with the Pentagon in building a military death ray attack capability in space? Later in this hour, we'll talk with Doctor Fred Meadows, Top Of The Morning's science reporter, for his analysis of this situation.

"We have no pictures from Easter Island yet. More than twenty-four hours after the space accident, NASA hasn't been able to get its own people, much less the news media, to Easter Island. But we do expect to have pictures via satellite this evening. They promise the interesting contrast of the space ship *Atlantis* alongside those enigmatic stone statues of Easter Island. Maybe the statues themselves will be able to tell us more than the space agency has, because NASA spokesman Roger Service says that NASA's rocket experts have no idea what caused the failure of the rocket engines that resulted in the emergency landing.

"Now for other news of the morning! Junk Rock Star Jock Steel was released on his own recognizance in Los Angeles last night after narcotics agents, acting on a tip, found both cocaine and Angel Dust in his possession after a record-breaking concert in Hollywood Bowl during which more than a hundred music enthusiasts were hospitalized for drug overdoses, injuries resulting from fights, and assorted bruises from being trampled by the enthusiastic crowds. Jeremiah Joseph has a report . . ."

CHAPTER EIGHT

"Pascua Tower, this is Hercules Re-
Analog Science Fiction/Science Fact

deemer Zero One, flight of three aircraft at Ostra intersection, landing Mataverí with clearance," came the voice over the loudspeaker in the control tower.

Frank smiled at his barefooted copilot. "Right on the button," he said in a tone of relief.

"Hercules Redeemer Zero One, this is Pascua Tower," the Chilean tower controller replied into the microphone. "Descend and maintain three thousand feet. Hold flight in line astern southeast over the Pascua VOR on the one-two-eight radial. Report the Pascua VOR. Wind one-one-zero at five knots, temperature two-five Celsius, altimeter one-zero-zero-five millibars. Landing Runway One-Zero. Approximately twenty-four hundred meters of Runway One-Zero available. Caution, Space Shuttle Orbiter *Atlantis* parked on the runway two hundred and fifty meters from the departure end of Runway One-Zero."

"Redeemer Zero One out of Flight Level Two-One-Zero for three thousand. Report Pascua VOR. Roger."

"Can they land on the runway with only twenty-four hundred meters available?" Captain Ernesto Obregón asked nervously.

Frank nodded. "They'll use less than four hundred meters of runway," he expalined. "That's why the Hercules are the first planes to arrive."

"Incredible," the military governor muttered. "But, then, all of this is. In a way, I'm glad you made an emergency landing here. It's certainly livened up our lives . . ."

"You haven't seen anything yet," Lew remarked.

The initial radio reporting point was over a hundred miles east, so it was

some time before three specks appeared in the blue sky.

It was a great sight to Frank to see the three Hercules transports wheel into line in the holding pattern. True, they wouldn't be able to get much done before sunset today, but they'd get on the ground.

From the flight deck of the lead Hercules, Red Richardson looked down anxiously at the *Atlantis* sitting on the runway. The long shadows of late afternoon threw the island topography into bold relief. Save for the volcanic cones and large rocks scattered across the grassy landscape of the island, the most prominent feature on Isla de Pascua—at least to Red's eyes—was the white *Atlantis* on the black asphalt runway.

The overnight wait in Santiago had been both boring and frustrating to Red. Delays in the takeoff from Santiago had frustrated him even more. But Isla de Pascua was now below. They'd made it at last. Now he could get to work!

"Redeemer Zero One, Pascua VOR at three thousand."

"Redeemer Zero One cleared for visual approach, Runway One-Zero. Redeemer Zero Two and Zero Three, remain in the holding pattern. Maintain visual separation."

"Zero One."

"Zero Two."

"Zero Three."

Pros, all of them, Frank thought with pride as the lead Herk broke from the pattern and began to swing northwest of the island, losing altitude as it did so.

"You're going to get a lot of practice in the next few weeks," the Shuttle pilot told the young Chilean tower operator.

There'd be a lot of air traffic into Pascua in the next two months with aircraft coming and going in the Shuttle Down operation. One of the reasons Frank wanted to be in the tower during the approach and landing of the initial flight of Herks was not only to hear their approach and watch them land, but also to check out the tower operations. He was glad to learn that the Pascuan tower operators—young Armada de Chile officers and men—seemed able to handle it. Their command of aviation English, the international language of air traffic control, was more than suitable. And it would get even better.

Looking through a pair of binoculars Obregón had given him, Frank watched as the big wing flaps extended and the wheels appeared beneath the fat fuselage as the lead Herk turned onto final approach.

From the flight deck, Red Richardson watched the approach from another point of view, thinking what it must have been like for Frank in the *Atlantis* coming in not at an approach angle of three degrees as the Herk was doing, but at more than twenty degrees—and with no landing aids, and *no* chance of being able to go around again if he missed that narrow strip of black asphalt ahead. It gave Red a new appreciation not only of all Shuttle pilots, but especially of Frank King and Lew Clay.

The Herk soared over Hangaroa, was less than five feet in the air as it crossed the landing threshold of the runway, and touched its four main wheels 200 feet down the runway. The pilot moved the propeller levers forward past a detent notch on the throttle quadrant, and all four props went into reverse pitch with

a roar. The 60-ton airplane came to a smooth but rapid stop about a thousand feet down the runway just abreast of the tower.

"Redeemer Zero One, left turn at the intersection and follow the jeep. Redeemer Zero Two, cleared for visual approach."

"It *does* land in a short space," Obregón observed, "like a naval carrier airplane."

"The Herk has actually landed and taken off from a carrier," Lew added. "Damndest sight in the world."

"You're not going to have much room on the ramp," Frank said. "I hope Richardson's bringing in some construction equipment to expand this airfield."

"According to the messages from Santiago, he is. A great deal of it. In order to prevent a customs problem, the United States is consigning the equipment to my government . . . and I don't know what we're possibly going to do with it afterwards . . ." the military governor remarked. "We should get down to welcome them."

People were pouring out of the parked Hercules by the time the three of them had descended the tower stairway and walked across the ramp. "How're your feet holding up?" Frank asked his co-pilot who'd spent the day shoeless.

"Getting so I like it . . . a little," Lew lied. The bottoms of his feet were almost raw. He was looking forward to being able to borrow a pair of shoes from someone on the recovery team. "Oh, boy, photographers! I didn't think they'd bring the media along on the first plane. I'll bet we look just like a couple of beachcombers . . ."

"Yeah, you're going to blow the image all to hell, Lew." Frank said and couldn't help smiling.

Two people disembarked with cameras and began shooting photos almost at once. Neither Herb Haynes nor Alice Arnold was going to miss the great photo of the Shuttle pilots—one barefoot in the tradition of the old south sea island beachcomber—and the natty little Chilean naval officer walking toward them.

The rear loading door and ramp of the C-130 were already being opened and prepared to disgorge the cargo inside. Whoever the crew was, they were working fast.

"Hi, Frank, glad you're all right." It was a rather haggard Red Richardson who strode up and grabbed the Shuttle pilot's hand. "You, too, Lew, but don't tell me you've gone native already?"

"*Ia orana oe!*" Frank said to him.

"What's that?" Richardson asked.

"Standard Pascuan greeting. Long story. Tell you more about it later." Lew replied curtly, eyeing Alice and Herb.

"Good to see all of you." Frank spoke up. "It's been a long two days."

"Tell me all about it." Red muttered.

Frank introduced Richardson to Captain Obregón, and the two shook hands in a friendly but formal fashion. Red then reached into the pocket of his jacket while saying, "Well, Governor, you'll want these." He handed Obregón a handful of blue-covered U.S. passports.

"Thank you, Mister Richardson. I don't think it's an absolute necessity at this point, but it's a formality that I'll have to note in my regular monthly re-

port to Santiago." He looked at the five passports—one for Red Richardson and the other four for the crew of the *Atlantis*. He said nothing as he looked them over, then remarked to King, "Frank, you and the other members of your crew had better sign your passports before some immigration officer notices and gives you trouble. We can do that later in my quarters, if you wish." He pocketed the passports and added, "Mister Richardson, would you have the rest of your people turn in their passports at the Hotel Hangaroa? One of my officers will pick them up there. And I apologize because quarters will be very cramped in the Hotel. We're not equipped to handle this many people . . ."

"Governor, let me get the *Atlantis* off the runway, and I'll get some C-5 Galaxies in here with a tent city for our crews," Red explained. "We knew of your shortage of facilities, so we're bringing our own . . . and you can keep them here from now on to handle contingencies."

Obregón nodded. The latest messages from Santiago explained there would be no customs formalities with the equipment coming in—except for the specialized *Atlantis* handling equipment that was listed in detail—because the United States had graciously consigned the equipment to Chile in return for the hospitality of that government in cooperating so fully with the rescue mission of the *Atlantis*. The Captain knew what had gone on between Washington and Santiago, and he was frankly amazed that Santiago had gotten away with so much . . . and that the United States had conceded.

"I've got to figure out where I can put it all," Red began, looking around.

"Have you had supper yet? Would you care to join me for dinner in my quarters?" the military governor interrupted the NASA mission manager. He wanted to get to know this short, square, sandy-haired, ruddy-complexioned man from Houston with whom he was going to have to work closely in the ensuing weeks.

"Thanks, I'll take you up on that, Governor. But first I'd like to get my propellant crews up to the *Atlantis* to get that tetroxide into safe containers. I want to eliminate that safety hazard right away."

"Agreed." Obregón turned slightly to face several others who'd joined Red on the ramp. "And these are the other members of your team?" he asked.

"Oh, sorry. I've had the *Atlantis* on my mind for the last few days," Red apologized. He introduced Casey Laskewitz first.

"Governor, a pleasure. I'd like to meet with you at your convenience to brief you on the press people who're coming in here and what they'll be demanding from you . . . and how I'll be able to take most of that guff off your shoulders, if you want me to . . ."

"American media people? Ah, yes, I know a little about them," Obregón replied with a slight smile. "Señor Laskewitz, I'll be *delighted* if you'll get that monkey off my back, sir."

Casey peered at the wiry little man. "You were educated in the States, weren't you?" he asked.

Obregón nodded. "VMI," he admitted.

"I thought so. My folks sent me to

The Citadel. It seems to me we trounced VMI in football a couple of times."

"I'll forgive you, Laskewitz," the military governor told him. "Some-time you'll have to tell me why you went into journalism instead of the military . . ."

"Very simple," Casey replied. "I was a space buff, but I couldn't pass the physical for a service pilot, so there was no use trying to promote space flight among missile generals and submarine admirals."

When Red introduced Joyce Fisher, she spoke to the governor in Spanish. Obregón bowed from the waist and kissed her hand in true Latin style. To some embarrassment from the others, the two of them chatted rapidly for about a minute. Then Obregón said, "I hadn't anticipated that you'd have such a lovely diplomatic representative, Señor Richardson. An attractive young lady who also grew up in Santiago will make my job much easier . . . and the whole project much smoother. I guarantee you. Señorita Fisher has agreed to join us for dinner once you've taken care of those propellants . . ."

It was going much better than Red anticipated. Obregón blew away Red's preconceived notion that he'd be some paunchy Chilean admiral assigned to Isla de Pascua to get him out of the way politically or to give him a final command before retirement. Obregón was none of these, but Red was wondering why the Chilean Captain had been posted to such a remote command. Obregón obviously had the trust of his superiors in Santiago, but why would they send him to such an isolated outpost with such restricted resources? Richard-

son didn't understand the logic behind it, if there was any, and resolved to ask Joyce about it when he had some time—if he ever did.

The first thing to do was to get the tetroxide out of the *Atlantis* and to begin getting things organized for the explosive influx that was to occur during the next few days.

"Governor, here's my plan for this evening," Red began to explain. "First, we'll get the propellant unloading and storage equipment and crew busy up at the other end of the runway. And somehow, we've got to park these three Herks temporarily. The second Herk has a tow truck to bring the *Atlantis* back down to the ramp so the runway can be cleared. We have to have a place to park the *Atlantis* until we get the cranes set up and the carrier aircraft in. The second Herk also has a satellite ground station—which will stay on the island, by the way, so you'll have regular worldwide communications, especially with Santiago. We'll have it set up possibly by tomorrow morning. The third Herk is nothing but a tanker to refuel the first two. We'll fly Number One back to Santiago tomorrow with the tetroxide aboard; I want to get it off the island right away. Then . . ."

Obregón held up his hand. "I understand the urgency of removing the hazardous propellant, Señor Richardson. And I suggest you do it as quickly as possible. But I doubt that you'll be able to get much more done before dark. We have runway lights, but no ramp floodlights. We don't have the electric power available. Get the propellant out, let's have dinner, and we can spend some time tomorrow morning going

over your plans and working out the details . . ."

"Governor," Richardson began. "we'll work all night if we have to. We have other aircraft coming in from Santiago once we report the runway's clear. We haven't the luxury of being able to make this a leisurely operation. The *Atlantis* represents twenty-five percent of the American space capability, and we've got to get her out of here as quickly as possible."

"I fully understand," Obregón replied. "I'm aware of the situation. I'm also aware that Santiago has an inspection commission arriving in the next several days. So I can't let you do anything with the *Atlantis* except park her and wait for the commission to inspect her. Please get the hazardous propellant removed and safely in storage. Then I'll expect you at my quarters for dinner because you won't be able to do any work after sunset. It gets very dark here very quickly . . . in spite of a nearly-full moon. Most of the other things you mentioned can wait until tomorrow. I want to know and approve those locations where you'll be installing equipment and facilities so Isla de Pascua isn't unduly disturbed. Dinner at nine o'clock?"

While this conversation was going on, both Herb Haynes and Alice Arnold had their tape recorders running and were madly snapping photos of everyone involved.

Red sighed. Well, if the governor wanted to discuss matters over dinner, he'd go along for right now at any rate. It didn't seem he had any other choice. But he was certainly going to have a word with this military governor later

tonight because Red had a job to do . . . and he wasn't going to let anybody slow him down. "We'd better get busy then," he said. "If you'll excuse me, I'll see you at nine." He turned from the party and began to stride toward where the propellant crew was unloading the Herk.

"Colonel King," Alice Arnold broke in, "I'd like to get an interview with you and the other three members of the crew . . ."

At which point Casey stepped in, "Alice, you know Hap Hazard's down with dysentery . . . and I need to get together with Frank here and find out . . ."

"What're you going to do? Get your stories straight? Or are you planning to brief them on what to say to us?" the woman reporter wanted to know.

"Neither. I'm tired. You're tired. The crew's been under tremendous stress. Let's get everybody settled in here, and I'll arrange a press conference for you and Herb in a couple of hours. Okay?"

"Hell, no! What's the matter with right now? And what's the matter with an exclusive?"

"Why, nothing at all's wrong, ma'am, if you want to interview us right here," Frank told her, shooting a quick glance at Casey to tell him wordlessly that he was going to get this news hound off his back in short order. "We're happy to talk to you or anybody else. We're easy to get along with when it comes to working with people having common decency and respect for us as individuals . . ."

"I'll second that," Lew put in.

Herb Haynes moved in, determined

not to let Alice get an exclusive.

"I notice you've removed your boots, Commander Clay," Alice said into her microphone. "This is the first time I've ever seen a barefoot astronaut. Taking up the native ways of this south sea island, perhaps?"

"Uh . . . Not exactly," Lew told her. "It was just . . . comfortable, that's all. Our contingency landing was kind of stressful, and it just felt good to wiggle my tootsies in the sand."

Casey couldn't suppress a laugh. Lew had said it so seriously that it had caught Alice Arnold completely off guard and left her with absolutely nothing to say, which was extremely unusual.

"Colonel King," Herb Haynes asked, "what went wrong yesterday?"

"Look, we may both hold military rank," Frank pointed out, "but as NASA Shuttle pilots, we've put our soldier suits in the closet. I'm just plain 'Mister' until my NASA Shuttle assignment's over and I go back to wearing a blue suit."

"Sorry. I'll repeat my question: What went wrong yesterday?"

"We don't know," Frank replied, unconsciously using the accepted first person plural of a NASA man being interviewed by the press. "The main engines simply shut down. We were beyond the point where we could return to Vandenberg and we didn't have enough velocity to go all the way around the world to Vandenberg in a degraded orbit. We're just fortunate that Pascua's here and Mataverí has a runway long enough to handle the *Atlantis*."

"And nobody knows what caused it?" Herb Haynes sounded a bit incredulous.

"Herb, Frank and the crew didn't have time to think about why it happened," Casey interjected. "They had their hands full landing the *Atlantis*. We may get an answer once the experts have the opportunity to thoroughly examine the *Atlantis*. Then again we may not because the fault could lie with the External Tank . . . and that's under about two thousand feet of water."

"Could this affect any further operational flights of the other Shuttles?"

"Probably not. The system's well proven now. The only thing that might affect the Shuttle operational schedule is the possibility the investigators might find something when they inspect the *Atlantis* once we get her back to the States," Frank explained. "But it couldn't be a major glitch, not after years of development and operations . . . and lots of successful Shuttle flights to date."

"Mister King, was it difficult to land the *Atlantis* without all the special equipment they have at the Cape?" Alice Arnold had finally found voice again.

Frank shook his head. "We've practiced it time after time in the flight simulators at Houston. We all knew what to do and how to do it."

"In other words, it was easy?"

"I didn't say that. Even with the full automatic system available, landing an Orbiter's like trying to get a streamlined brick to glide."

Alice Arnold looked at the commander of the *Atlantis* as a hawk might look at a prairie dog ready to be grasped and eaten. Casey knew the look: he'd seen it on other predatory women, the astronaut groupies who'd beaten a well-

worn path from Lompoc to Lancaster to Houston to Cocoa Beach. Frank King was, Alice Arnold decided, quite a hunk of man in the quiet, competent, and virile mold of John Wayne. She decided she'd stay primed for opportunities because, after all, they were a very long way from home.

Casey decided he'd better warn Frank . . . if the Shuttle pilot didn't already recognize it. After all, Frank had a wife and two kids back in Seabrook.

Alice went on. "Where are the other two crew members?"

"As Casey probably told you, Hap Hazard, the payload specialist, came down with dysentery; he'll be all right," Frank said.

"How could he possibly get dysentery?" Alice wanted to know.

"Easy. You may end up with it yourself on Isla de Pascua."

"Uh, King," Herb Haynes asked, "what about the Soviet claims that the *Atlantis* is carrying a military beam weapon satellite?"

Both pilots snorted. "Ridiculous," Frank snapped. "When the Chilean commission gets here, they'll see for themselves."

"Will we be allowed to go aboard and photograph what's in the cargo bay?" Alice asked.

Frank looked at Casey and replied, "Why not? It's just a Landsat. We've got nothing to hide . . ."

"How will we know it's a Landsat and not some military satellite camouflaged to look like a Landsat?" Alice was boring in.

"Because you can take all the pictures of it you want, and then you can

go to GE Valley Forge and take all the photos you want of its back-up twin-brother there."

"Then what in your opinion is behind the Soviet claims?" This was from Herb.

Casey shrugged. Herb looked at the two pilots who also shrugged.

"But this is a military crew, isn't it?" Alice asked. "You're a Colonel in the Air Force, and Clay's a Commander in the Navy . . . And the *Atlantis* was launched from a military space facility . . ."

"We're both service pilots on assignment to NASA for one simple reason: only service pilots are able to get the necessary flight experience in high-performance aircraft that's required to fly the Shuttle. But Jackie Hart's a civilian, and so's Hap Hazard."

"When can I talk to them . . . especially to Jackie Hart?" Alice asked Casey.

But it was Frank who replied. "As soon as we get off this ramp and down to the Hotel Hangaroa where she's helping care for Hap Hazard . . ." He turned to where Captain Ernesto Obregón was standing waiting, and Frank suddenly felt very embarrassed for the Chilean military governor who was being totally ignored by these two reporters. "Governor, your jeep and perhaps one or two other jeeps are the only vehicles I've seen on Pascua. Is there any way we can arrange to get these people to Hangaroa?"

"It's not very far to walk," Obregón began. "Less than a kilometer. I don't believe the Hotel's station wagon is running now. We didn't have reservations for any tourists for over a month to

come, so it gave us an opportunity to get some necessary maintenance done."

"No cars?" Alice asked incredulously. "You expect me to walk carrying all this equipment?"

It was a very good thing, Frank thought, that Obregón had been educated in America because he understood Americans such as Alice Arnold. Many officials in other countries would have reacted to Alice by throwing up series after series of impenetrable roadblocks in retaliation. But the Governor wasn't just another bureaucrat; he was indeed a Latin gentleman, in spite of Alice Arnold.

"I'd be honored to take the Señorita to the Hotel in my jeep," he said with a slight smile playing around the corners of his mouth. "I certainly would never want it said that the military governor of Isla de Pascua didn't treat his guests in a gracious manner . . ."

When they got to the Hotel Rangaroa, Alice Arnold insisted on seeing Jackie and Hap . . . and she started to get nasty when Frank told her. "Let me check to see how he's feeling. The doctor recommended he get plenty of rest."

"I'm coming with you," Alice said flatly.

Frank sighed. "You probably will, but that doesn't mean I'm going to let you into Hap's room if he's not feeling well."

Hap was feeling better and said he'd talk with the two reporters for a short time. This solved a big problem for both Frank and Casey. Naturally, Alice Arnold's first question was, "How'd you manage to get dysentery?"

"Got hold of some local food that had the bacteria in it," Hap explained.

"How come no other crew member got it?" Herb Haynes wanted to know.

"Doctor Esteban says most people here are immune," Hap explained. "Dysentery's a fairly common tourist disease, mostly in its milder forms."

"Kind of like Montezuma's Revenge," Herb remarked. "But it looks like you had a bad case, Hap."

"I did. Thought I'd die, then was afraid I would . . ."

"And Jackie's been nursing you all day?" Alice wondered, looking at the little blonde mission specialist who wasn't very much older than she was. Alice noted that Jackie was barefoot as well as Lew and Hap.

"Hell, no," Jackie exploded. "I'm no nursemaid! Hap was pretty damned sick, and I did what I could to force fluids into him so he wouldn't dehydrate."

"And I imagine you kept his morale up, too, didn't you, dear?" Alice asked.

"Damned right! Except Hap didn't need morale boosting . . . until you got here . . ." Jackie had the measure of this woman reporter, and she wasn't going to be pushed around in any interview. She didn't like Alice Arnold, and she didn't mind letting Alice Arnold know it.

And that made things difficult after the brief interview was over and José Hey told Alice as she was checking in, "I hope you will not be upset if I ask you to share a room with someone else because we are very crowded with all the people here. We have only two other lady guests, and I hope you will not object to sharing Señorita Hart's room with her and Señorita Fisher . . ."

Alice did. She steamed and stormed,

but there was no alternative. Jackie didn't like the idea either, but gave in under the circumstances.

Joyce didn't complain but struck up a lively conversation with José Hey in Spanish . . . a factor that didn't endear her to Alice who remarked when they were together in the room, "Miss Fisher, as the prime reporter for AP covering this affair, I'd appreciate it if you'd speak English rather than conduct secret conversations with the natives in Spanish . . ."

Joyce simply ignored the request without comment.

Red Richardson dragged into the hotel at eight thirty, looking very tired indeed. He found himself sharing a room with Frank and Casey. "We got the tetroxide out without any trouble. That must've been a real gentle landing, Frank. There wasn't a leak in any of the systems. The OMS piping was tight, and so were the vernier systems."

"That's a load off my mind," Frank admitted. "I've been sweating it for the last three days. I didn't think we had any leaks; I couldn't detect anything when I went back aboard yesterday."

"You went back aboard?" Red asked. "With all that tetroxide still there? Haven't we told you guys to get the hell away from an Orbiter if you make a contingency landing?"

"Had to go back," Frank explained, "to get the medical kit. Hap was pretty sick, and he needed the antibiotics and diarrhea pills. Under those conditions, Red, I'll break the rules . . ."

"Yeah, I guess so. But where'd the rope ladder come from?"

"Jackie had it in her personal effects locker. She wanted some way to get

back aboard if we had a contingency landing, and we *did* need to get back in. Red, put a rope ladder aboard as part of the contingency egress kit, will you?"

"Hell, yes, a good idea. Why didn't Jackie bring it to the attention of Duke Kellogg or some of the planning team?"

"She did. I guess they ignored her," Frank remarked. "Come on, get washed up. We're due at Obregón's in less than twenty minutes."

"Look, fellas, do I really have to go to the Governor's dinner?" Red wanted to know. "I'm bushed."

"Red, you'd insult Obregón if you didn't show up," Casey remarked. "And we've got to work closely with this man for the next six weeks."

"Well, okay. But I haven't got anything formal to wear . . . just work clothes."

"On Pascua," Frank explained. " 'formal' means clean clothes, period. Ernesto runs a tight operation, but he's no martinet . . ."

"Sounds to me," Red observed. "that you've struck up quite a friendship with the Governor."

Frank nodded. "We found we have a lot in common. He's a very cooperative guy and he's got rough duty here."

"Rough duty? On a south sea island?" Red asked incredulously.

"You don't know this place, Red. It

is rough duty. And it's not a south sea island. This may hit you tomorrow."

"What do you mean?" Red asked the Shuttle pilot.

"We have the *Atlantis* sitting out there at Mataverí representing the high technology that all of us work with every day and take for granted," Frank pointed out. "but you're going to find that you've stepped back at least a hundred years in time. If you hadn't showed up with a tow tug, Obregón and I had worked out a way to pull the *Atlantis* back down the runway to the ramp using ropes and a couple of hundred men . . ."

"What?"

"The ancestors of these Pascuans moved those *mouli* more than ten miles from the quarry at Rano Raraku using human muscle power," Frank explained. "What makes you think we couldn't move the *Atlantis* on its own wheels along a paved asphalt runway using the same ancient technology?" Then he added, "But I'm glad you brought the tow tug. It's an easier way to do the job . . ."

"I'd heard they used levitation," Casey said.

Frank shook his head. "If they knew how to do that, my friend, I wouldn't be flying a Space Shuttle Orbiter . . . and we'd all be out of a job."

END OF PART TWO

● The whole of science is nothing more than a refinement of everyday thinking.

ALBERT EINSTEIN

THE REFERENCE LIBRARY

by Tom Easton

Magical Changes, Graham Oakley, Atheneum, \$12.95, unpagged.

CommuniPath Worlds, Suzette Haden Elgin, Pocket Books, \$2.50, 348 pp.

The Sixth Winter, Douglas Orgill and John Gribbin, Simon and Schuster, \$10.95, 384 pp.

The Final Countdown, Martin Caidin, Bantam, \$2.25, 230 pp.

A Wizard in Bedlam, Christopher Stasheff, DAW, \$1.95, 191 pp.

An Enemy of the State, F. Paul Wilson, Doubleday, \$10.00, 269 pp.

Wild Seed, Octavia E. Butler, Doubleday, \$10.00, 248 pp.

Star Hunters, Jo Clayton, DAW, \$1.75, 176 pp.

Wanted, Eric Seidman, producer, Bantam, \$9.95, 48 pp.

Magazine book review columns usually seem to be one-man shows. Until 1979, the Reference Library certainly was, under Lester Del Rey, P. Schuyler Miller, and Spider. Now Spider and I share it, following a pattern you can find in few other places; *F&SF* may be the notable exception. Presumably the sharing gives you, the *Analog* reader, the benefit of different viewpoints, relief from the boredom of the same old reviewer constantly riding some idiosyncratic hobbyhorse (we don't really do that, do we?). More to the point, you sometimes get to see two opinions of one book without having to buy two magazines. Personally, I think such duplication is more valuable when Spider and I happen to disagree; he thinks it's worth enduring even when we agree—being opinions, he says, any agreement is remarkable. Whoever's right, we're trying to keep the duplications under control, since we can review few enough books as it is. We exchange lists of the titles we're covering, and we try not to duplicate unless we have something cogent to say. That is, if my review is little more than a

summary and opinion, with no comments in a larger context, or with no particularly snappy zingers, and Spider writes that he is reviewing the book too. I'll pass. He can tell you for himself how he decides what to do.

Any preferences on how we should handle this?

Science fiction is a literature of change, of difference. It is different from other genres in its focus on changed pasts, presents, and futures. It changes our view of the cosmos by showing us worlds different from our own. It changes within itself, too, as a story sets up an expectation only to twist it, to entangle the reader in incongruities.

This flexibility of SF is one of the reasons we like to read it. We enjoy the stretching of our imaginations in much the way exercise nuts enjoy the stretching of their muscles. We and they even enjoy the pain of the stretching—and be sure, if it hurts, it's probably good for you, or so my sainted grandmother might have said. The stretch needn't hurt to be enjoyable, though. There is plenty of SF tailored to stretch our minds slightly or not at all. It uses the stock elements of the field, the clichés, adding very little that is new, and while it may stretch the novice mind, it pretends to nothing more than old-shoe familiarity to the long-time fan.

There is also a rare category of SF—and fantasy—that stretches the mind both mightily *and* painlessly. It can do these two mutually contradictory—according to my above comments—things because it offers amusement, humor, joke-like surprises. It offers change without criticizing or asking anyone to reexamine their thoughts, prejudices, or feelings. It offers. . . .

The heck with it. I'm trying to work

out a deceptively intellectual lead-in for Graham Oakley's **Magical Changes**. He's an Englishman, perhaps typically so, who had "the idea for a split-page book in the back of his mind for almost ten years" (from the jacket copy) and finally did something about it. Boy, did he! There's not a word of text to the book. Just pictures, each one split horizontally so that you can turn top halves or bottom halves and have every top match up with every bottom. Begin with the Charles-Addamsish couple in their suburban garden, watering the roots of six *Gigantum horridus flabbergasti*, a horrified cat looking on and a tourist bus in the background. That's the bottom half. Now turn the tops—the *Gigantum* blooms are umbrellas—no, they're dinosaurs, lollipops—no, carnivorous exotica—or, wait! a nest of tribal totems—spaghetti!—flags! And so on, with nary a scrap of cliché. The book is a delight, guaranteed to appeal to SF and fantasy fans and to children of all ages. Is it good for you? It sure don't hurt, but who cares! Don't miss it if you can possibly help it. It's not cheap, but it has to be a better conversation piece that anything else you can find at thrice the price.

For a very different opinion, let's look at Suzette Elgin's **Communipath Worlds**, a trilogy in one volume, containing *The Communipaths*, *Furthest*, and *At the Seventh Level*, all from the early 1970s. All three tales are set in a single universe, where telepathy serves for communications. Untrained, "wild" telepaths can fill the ether with static, and this provides the premise of the first, in which an infant of immense talent is born and taken from its mother for training. The mother, no slouch herself at telekinesis, vows war on the system to get her babe back, and here

Coyote Jones has to resolve the situation. He does so, and in the process finds a way to ease the lot of the telepaths enslaved by the system's need for communicators.

Furthest brings Coyote Jones to a strange world with stranger customs, including that of the "mindwives," women trained by tyranny to provide erotic visions for aging men. He must unravel the reasons for the customs and find a way to be sure that *Furthest's* delegate to the Tri-Galactic Council is not off his rocker. He succeeds, mainly thanks to a mindwife's love.

At the Seventh Level presents an alien world whose women are chattels as closely kept as any ever were on Earth. Home and hearth are all, and the only career available is the religious one of Poet—but the penalty for trying to qualify and failing is a life in solitary. One woman has succeeded in recent years, and she is at the pinnacle—the seventh level—of Poetry. Yet someone is trying to kill her. Coyote Jones' job is to save her.

Good stories all, entertaining events, a saucy hero, plenty of action, rich detail. But—and it's a big but—they are not for anyone with a half-way precise turn of mind. Elgin's civilization occupies "the Three Galaxies," in which the planet *Furthest* is "really a long, long way out there. There's not another inhabited planet . . . within nineteen million miles." (p. 209) There is a problem of scale here that boggles the mind and pegs Elgin, however competent she may be as a writer, as an ignorant hack without the integrity to check her backgrounds out. Strong words? Maybe, but such sloppiness pisses me off.

On a more positive note, with just a touch of subterranean grumbling, we

have **The Sixth Winter**. The book's authorship isn't perfectly clear. The jacket says "by Douglas Orgill with John Gribbin"; the title page says "Douglas Orgill and John Gribbin." Orgill is a military historian and novelist; Gribbin is an astrophysicist and science popularizer; both are Englishmen. My guess is that Orgill wrote the story to a disaster scenario knocked up by Gribbin from his own work on climate studies.

Whatever, it works. Dr. William Stovin, the story's hero, believes an ice age can strike quickly, over a mere handful of winters. When tornadoes of bitter cold begin to strike, freezing whole villages instantly in much the way the mammoths once were, it begins to seem he is right. A quick trip to Alaska finds a folklore of the twisters, called "Dancers," and Bisby, a half-breed Eskimo bush pilot. Soon, Stovin is off to Siberia to study the effects of a Dancer close up. He takes his girl, wolf specialist Diane Hilder, and Bisby. In Siberia, he decides that Dancers result when the jet stream dips downward to touch the Earth with the cold of space: lateral deviations bring mere Arctic cold southward. He sees the storms strike. The wolves remember their adaptations to an earlier ice age and begin to band together in immense, man-hunting packs, and civilization crumble. Thanks to Bisby, he escapes disaster time and time again.

Meanwhile, Chicago is evacuated before instant glaciers, civilization around the hemisphere moves south, and people die in droves. The ice age is here to stay. And it makes gripping, compulsive reading—though hardly for a cold winter's night. Open these pages only in summer's heat, or you are likely to suffer from a rather chilling parano-

My grumbles? I can't swallow the

Dancers, especially as jet stream dips. Nor can I swallow ancestral memory, neither for wolves nor for anything else (Jung was full of . . .). The former isn't even necessary for the story—it adds a note of climatic violence, for which some explanation is necessary, but isn't a fast-approaching ice age dramatic enough? The latter adds primeval forces, an active evil, an old fear, but even that isn't necessary when normal wolf behavior could be played up to be quite chilling enough.

Never mind. Read the thing. Nits or no nits, it's good.

And now—oh, my! oh, my! oh, my! **The Final Countdown** is “a novel by Martin Caidin based on a screenplay by David Ambrose & Gerry Davis and Thomas Hunter & Peter Powell; based on a story by Thomas Hunter & Peter Powell and David Ambrose.” It is therefore suspect, right? But let's add one more “based on”—the concept could well have been swiped from Algis Budrys (“Warbirds of Time”). And that's enough. If you read the thing, you'll get slam-bang adventure, chills and thrills, excitement galore, as long as you keep your critical faculties turned way down. The story is that of a nuclear aircraft carrier caught up in a time-storm (explained as the source of the Bermuda Triangle! Footnote: did you know there is now a book out called *The Bible and the Bermuda Triangle?*) and dumped into December 6, 1941, just before Pearl Harbor. Modern fighters scramble to shoot down Japanese Zeroes, the crew is hot to come down on the attacking fleet like crows on a cornfield, and, . . . I won't tell you the ending, just in case you read it or see the movie. Suffice it to say it's anticlimax, history is protected, and the hero's presence is finally fully explained. The tale is fairly

well told, with deft characterization and individually convincing scenes, but it is totally ruined by a rationale so ridiculous that “even” SF writers have long since refused to touch it with a straight face.

Why do I bother with such books, you ask? Why don't I give the space to something better? Isn't it something like shooting fish in a barrel? Well, yes, it is. I bother because SF deserves a better popular image than Hollywood or the mass market will allow. The monstrosities they foist on the public in our name (they sent me a review copy, didn't they?) need to be publicized as monstrosities, even when the stories *qua* stories aren't so bad. So—when your mundane friends try to tell you about this *great* SF book/movie, tell them, beat it into their skulls, that this *ain't* SF: it's fantasy, and poor fantasy at that. Budrys handled the theme one whole helluva lot better, and he did it as SF.

And now for the really good stuff. I have read one novel by Christopher Stasheff before, *The Warlock in Spite of Himself*, and I enjoyed it tremendously. The man has a nice sense of the irreverent and a bit of the bawd, and he spins a yarn good enough to leave you wanting more. Now we have **A Wizard in Bedlam**, an equally appealing yarn. The theme is similar—an offworlder lands to lead a revolution and bring a feudal world to civilization. But this offworlder is a refugee, fled in childhood and brought up by a group of fellow refugees founded 500 years before. Their purpose is to provide the weapons when the time foretold in a 500-year-old rhyme rolls around and the hero of the last rebellion, De Cade, returns. Our revolutionary, Dirk Dulaine, lands one dark night, meets a non-native offworlder, the giant Gar, and promptly

runs afoul of a local Lord. Gar saves him, he saves Gar, the rebels who dwell in the forest save both, and Gar finds De Cade's ancient bones and staff. At that point, De Cade rises from the dead to take over Gar's body, and the rebellion is on.

So far, ho hum—you've seen it all before. The original touch is that this world was colonized by a couple of thousand would-be Lords and twelve (that's right, one dozen) servants. The servants were cloned to provide masses of identical peons before being turned loose to breed and live in identical homes. With heredity and environment thus rigidly specified, the members of the lower classes tend to think and act very much alike, and in battle they need little leadership. They make very effective rebels.

It might even work that way. And when you add that the peons' situation selects quite stringently for the unusual combination of high intelligence and great patience, you have a population that should be capable of great things, in far more than war. I hope that Stash-off will return to this world in the future.

F. Paul Wilson is in love with an idea that has long appealed to anyone disenchanted with existing forms of government. All governments exploit and oppress; the differences lie largely in how much you *think* you have to say about it. The key to a government that neither exploits nor oppresses is the acronym-slogan KYFHO (Keep Your Fucking Hands Off!). Leave the people to handle their own affairs, and don't meddle. That's anarchy, folks. I'd love it myself, though I don't believe human beings as presently constituted could possibly make it work. It would take a different breed, in whom responsibility and self-reliance are as ingrained as our

tendency to cuss when aggravated.

Wilson knows this too, and his anarchists, unlike LeGuin's, are different enough from their tromped cousins to be reacted to as aliens. They are the core of the LaNague Federation, the interstellar "government" which backdrops many of these stories. The Federation's origin is described in **An Enemy of the State**, in which the Tolivian (sic) anarchist Peter LaNague engineers the downfall of the Outworld Imperium. He does not use violence, that being contrary to his principles, but Wilson does give him a nihilist foil who would love nothing better than complete and utter destruction. LaNague's tack is economic warfare. The Imperium has replaced stable, gold-based money with paper and is constantly raising taxes; Robin Hood tactics that restore the taxes to the people force the government to mint more cash, and hence force a continual devaluing of the money. Knowledge that the Imperium's economy, based on shipping food to Earth, will soon collapse as Earth develops alternate supplies and reduces need, allows LaNague to put more pressure on. A financier ally induced to sell short vast stocks of Imperial currency helps further.

Inflation is the weapon, and the result is deliberately reminiscent of Germany between the World Wars. A government falls, a new one rises. The situation is stabilized with a massive infusion of anarchist gold, and the first anarchist multiworld "government" is born.

It can't be that easy, can it? Perhaps Wilson's point is that economic instability produces a situation in which anyone can come to power. In Germany, it was power-mad Hitler. In *Enemy*, the deeply principled LaNague refuses power—it is offered—and puts his principles before the people. They accept

them, perhaps as a proxy for LaNague himself, their saviour.

As you might expect, Wilson's novel is peppered with lectures on economics and politics. Nevertheless, the book works and works well. It is both a philosophical tale and an action yarn, and the two are integrated naturally and well. Read it.

Octavia Butler has written several books which her jacket copy calls "Patternist" novels. I haven't seen them, as it happens, and I feel that I've missed something. **Wild Seed** is billed as a prequel to the series, and if they're all as well done as this one, they are good indeed. *Wild Seed* introduces a 4000-year-old mutant, Doro, who survives not in his own body, but thanks to a psychic ability to take over others; his own is long dead. He must shift periodically, for he draws some psychic nutriment from the bodies he occupies and uses up, and he can shift whenever he wishes; killed, he invades the killer. Over his long history, he has set up a breeding program in an effort to produce others like himself and to provide himself with more satisfying kills. Certain villages in Africa and America are occupied by people (and their descendants) he has found and brought together, people with talents such as telepathy, empathy, and telekinesis, people elsewhere doomed as witches. They regard Doro as a god, bowing to his will both in life and in death.

The book is also the tale of Anyanwu, another mutant, only 300 years old, with the ability to control her body utterly, to heal any wound, to change shape to fish or bird or beast. (Oddly, though she changes all the way down to the level of the genes, she retains her abilities. How?) She is not a product of Doro's breeding; she is thus "wild

seed." He finds her, collects her and her descendants, and breeds them all to add her talents to his stock. Yet she is more than an animal for his herds. She has a will of her own, a determination to remain uncorrupted, a sympathy for others that has become foreign to him through the ages. Yet each seems destined to be the other's sole companion and ally, for they alone are immortal.

Wild Seed is a tale of conflict and resolution stretching across a century and a half, from 1690 to 1840. It is warm, involving, sympathetic. And I am recommending it to my fellow SFWA members as a potential Nebula winner. It's that good. Immortality is a difficult theme to handle effectively, for long life must have its effects on personality, effects too few writers seem able to sense. An immortal must, Butler says, acquire either Anyanwu's wisdom and sympathy or Doro's coldness, callousness, canniness of survival. They are opposites in many ways, but elements of both are necessary for a truly successful immortal, and their blending might well occur as Butler paints it. My own leanings would take me down Doro's path. I fear, as either writer or immortal, and I would feel a need for an Anyanwu. Butler's story, for all that it is fiction, rings true as only the best stories can.

Jo Clayton has a neat conceit in her tales of Alecyts and the Diadem. Alecyts is a half-breed woman, born on a primitive world of a local man and a visiting woman of a race with strange mental powers, as detailed in *Diadem from the Stars*. As a young girl, she is forced to leave home, acquires the quasi-symbiotic diadem, a psychic amplifier of sorts, has and loses a son, and hits the star roads in a driven quest. The series is now in its fifth novel, **Star**

Hunters, and it remains good reading. Aleytys is an independent woman, strongwilled and competent, the total heroine. Now an apprentice with Hunters, Inc., she is sent on a mission her superiors suspect is a trap set by a group that covets the diadem, transferrable only at its wearer's death. A trap it is, though the trapper is something of a surprise, and Aleytys wins out over all. In the process, she affects a strange culture by her example, setting in motion one woman's liberation and stimulating a solution to the problem of the wildings, children whose telepathic-empathic gifts cut them off from speech and prompt their expulsion from normal company to be the prey of savages. Clayton is a sympathetic writer, given to tales with a definite action component, but focussing far more on character. Here, Aleytys is not really her chief concern. Rather, it is the natives Manoreh and Kitosime, man and wife. And it is Kitosime's character that changes most as she goes from pampered pet of her chieftain father to independent tamer of wildings. Though we know the next book in the series will continue to follow Aleytys, we wish Clayton would provide a sequel for

Kitosime and her fellows. This, perhaps, is the test of a good series installment—does it invite or permit a branching of the series?—a test this book passes with flying colors. If you're picking your reading blind, you could do worse than watch for Clayton's name.

And finally, we have a poster book that arrived in today's mail, just in time to fit it in at the tail of the column. **Wanted** was produced by Eric Seidman, designed by Andrew Kner and Emil Micha, and written by Ed Naha. In the guise of a collection of intergalactic wanted posters, it showcases the work of fifteen new SF artists, most of whom are reasonably good. The text—descriptions and vital statistics—is written with a distinct tongue-in-cheek flavor (old bubble gum?), and the whole offers an hour's entertaining perusal. The archvillains range from the sexy sex-criminals, the Randor sisters, to the sludgemonger Blote to the half man, half warthog voyeur Zhuk Orbz. And guess what? The head of the Intergalactic Security Bureau, Adam Hawkins, bears a bird-beaked resemblance to our own late Mr. Hoover. ■

With the recent popularity of fantasy gaming has come a marked upsurge in the number of gaming stories submitted to Analog. Most of those I've seen have not been very suitable—our readers tend to dislike stories which end up, in essence, "It was only a game." Our lead novella next month, "The Saturn Game," is a notable exception—as you might expect from its author, Poul Anderson. Games, after all, are related to reality in important and complex ways, and are an important aspect of human psychology. The expedition sailing out to explore Saturn's moons had good reasons for gaming, and could not really be blamed for failing to anticipate all its consequences. And what was at stake, ultimately, was definitely *not* "just a game."

Vincent di Fate has done a spectacular cover for "The Saturn Game." The February 2 issue also continues Lee Correy's *Shuttle Down*, plus a variety of other stories and features.

In Times To Come

BRASS TACKS

Dear Dr. Schmidt,

It so happens I have to say something about each of the last three issues of *Analog* which have reached me, March, April, and May.

March: Mr. Quick ("Think Ethic") hits the nail on the head when he hypothetically harnesses the minds of people freed of daily toil for creative development. But to my mind he overlooks two difficulties: Firstly, with an "Office of Creative Development," how do you avoid this becoming one more red-tape bound, nepotism-ridden, inefficient government super-agency? Secondly, how do you grade and evaluate for promotion the various different proposals? There is of course a finite probability that a fusion reactor proposed by a 70-year-old housewife is a better design than that proposed by a brilliant young physicist, but the odds do not look overwhelming.

April: Your editorial: You seem to favor a mixed-energy economy in the name of freedom from dependence. But unfortunately, small-scale energy may be beautiful, but is also very expensive. In an article published not so long ago in "Technology Review" it came out that a solar-heat home installation will pay for itself in 27 years, but since then mortgages have doubled and trebled. To my mind only big energy plants, no matter whether solar satellites, nuclear, hydroelectric, or fossil-fuel installations can give us cheap energy. So as to gain more freedom I propose a "common carrier" principle. Electricity grids and gas pipes to be nationalized or made into public corporations. Anybody can feed in or take out and pays or gets paid according to contract between supplier and customer; the corporation gets a transportation fee according to distance.

This will stimulate competition to maximum and thus bring freedom from monopolistic suppliers.

—Still April: Simak's "Grotto of the Dancing Deer" is a very fine story indeed. Not far to the west of his imaginary cave in the Circ de Gavarnie is the real cave of Altamira. Its paintings are admirable: nothing like them exists until Egyptian or Chinese times, some 20,000 years later. J. Michener in his "Iberia" extolls them. When we went a-visiting the cave, I expected something like Simak's bubble chamber with a central vent, but to my surprise the paintings are not on the walls, there being none. The cave is a flat lens, not even man-high and the paintings are on the ceiling. Gangways have been carved into the floor, so we can at least walk upright. The cave is reached by a labyrinth of tunnels and there is no direct outside connection and according to the experts never has there been any: utter lack of geological evidence—also with a direct opening the paintings would have deteriorated long since. This raises two questions: 1) How were the paintings drawn from a distance of less than 1.40m? (You paint, of course, at most at arm's length, but to get things into proportion you need to see from a distance.) 2) How do you paint without light? Remember, no outside connection. Any lamp or torch but electric or modern gasmantle would have smudged the ceiling indelibly. Chip away the smudge and you have a chipped place. None was ever found. Any suggestions, staff or kind readers or authors?

May: W. West tries to reintroduce steamers. Their superior driving quality is beyond doubt. No clutch, no gearbox. But the author's claim as to fuel consumption is all wrong. If he were correct, nobody would ever have built a Diesel locomotive with its energy-cat-

ing fluid converter or still worse electric drive; at most, steam locomotives would have been converted to oil-burners. As things stand, Diesels with all those encumbrances still come out on top. The Stirling motor is no longer experimental. It is even more economical than the Diesel and as far as I understand its driving qualities are akin to that of the steamer. I understand that Ford is expected to come out shortly with a Stirling car and MAN(Germany) with a truck. If the Stirling can be fuelled with coal dust, as the steamer certainly could, it will come out on top.

Sincerely yours,

JUAN G. LOWENSTEIN

You ask some good questions—and hard thinking about possible answers ought to generate some more good stories. (And maybe even realities.)

Dear Stan,

This is a note long overdue.

First, let me say that I am very pleased with the direction the magazine has taken under your "con." It actually seems to be getting back some of the flavor it had under Campbell. God rest his soul! Could it be the difference between having a "hard science type" running the show . . . and an English major?

My real reason for this brief missive is a slight complaint. In the June issue Jerry Pournelle mentioned a flock of neat ideas in his diatribe against whale slaughter . . . including one of mine. But (as you can see from the enclosed January issue and reaction) he didn't seem to remember *where* those possibilities *re* Europa came from, though he seemed to credit a lot of other people for their ideas. To keep the record straight I'm sending along both the

original and some of the reaction from the scientific community. If there is truly any place within our reach where the problem Jerry raises may meet us face to . . . (fin?), I think it's Jupiter's second Galilean satellite, for the reasons extensively outlined in my January piece in *Star & Sky*.

RICHARD C. HOAGLAND

The article in question is in Star and Sky, Vol. 2, No. 1 (January 1980), pp. 16-31—and should give somebody good ideas for science fiction.

Dear Dr. Schmidt:

I hope the sale to Davis augurs well for Analog. The Fiftieth Anniversary Year has been a nostalgia trip for me personally. Jack Williamson and Ray Gallun were both in the first issue of *Astounding* I ever saw (and does anybody ever forget the contents page of his first SF magazine?) —Williamson with the middle installment of "The Legion of Time" and Gallun with his still eminently re-readable "Seeds of the Dusk." Grasping for hopeful straws in a grim time internationally, I take comfort from the fact that the human race got higher marks in Gallun's story for Analog in February 1980, than it did in his story for June 1938—historically almost as bad a year.

What may be more important for the future than the persistence of old pros, telling tales as beautifully as Simak does his "Grotto of the Dancing Deer," is the rise of young hopefuls like Bob Buckley. "World in the Clouds" would be easy to criticize in a lit.-crit. kind of way, with its awkward shifts in character viewpoint, lapses in grammar ("he told Callaghan and I,") and the flatness of having the climax of a yarn thus adventurous take place in, of all

places, a debate in Congress! But the Biolog piece on Buckley makes it clear that he is taking the plunge, making the mistakes, but also achieving the goal of a first novel—and where, save in *Analog*, can a relative newcomer be showcased in such fashion? My Eng. Lit. colleagues, some of whom kill SF by their loving misunderstanding of it, would have nit-picked it to pieces; while a "mainstream" fiction publisher would have made him rewrite, or write in large hunks of explicit sex à la Harold Robbins. Left alone to tell an *Astounding/Analog* story, he has come up with what hooks us all into science fiction in the first place: a three-dimensional, vivid, believable other world in which things happen to people we care about. I look forward to more from Buckley.

Sincerely yours,

PAUL A. CARTER

Dear Stan:

I have some suggestions for the 1980 Analytical Laboratory. First, in the way of categories. I think that they should be: serial, novelette, short story, article, cover, editorial, writer, and issue. Second, I think each reader should rate each of his stories on a 1.00-10.00 scale (e.g. 4.88), and to come up with each story's score somebody should average every score. Third, I think that they should pick the top five in each category instead of the top three.

By the way, I've already had my chance to send in a vote form to the Analytical Laboratory (I used it) but I would like to say something about the results. How Orson Scott Card's "Songhouse" could get *onto* the top five, much less run away with the novelette division (or, for that matter, get printed), is beyond me. It was so boring I couldn't even get started. I read a few excerpts (about eight) and at least two

Analog Science Fiction/Science Fact

made me unable to eat at suppertime. While I admire Mr. Card greatly, this, I am forced to say, is the worst all-time story I have read.

Yours with regrets,

BOB CARRICO

Rt. 4, S. Sutton Ln.
Mayfield, Ky. 42066

No doubt your suggestions (or any of several others we received) would give us a finer-tuned measurement of what you're thinking out there. Unfortunately, most such suggestions would make the analysis more complicated and we just don't have the manpower to handle it. So we have to keep it pretty simple.

Your observation on "Songhouse" is typical: nearly any story which many readers love, others hate just as enthusiastically. It's the ones that nobody loves or hates that we worry about.

Dear Mr. Schmidt:

It's one of Analog's purposes to bring odd bits of information together and make them click. These two might be odd enough to be of interest:

A page flipped to the scene where the nurse in "Anasazi" was thinking Rai and his bullet wound were both a little septic; and taken out of context that way, it reminded me that somewhere in the dim past I had read an early explorer's account of the extreme hardihood of "savages," concluding in the colorful remark that if you struck one with an ax, One would scarcely take note of the wound, but it would close up in a few days and hardly leave a scar. Only a few days ago—I could probably still find the reference if I cared—I read an interview with a doctor attending the Tour de France. He said that he never

used antibiotics because the athletes complained that they made them tired; he would clean a wound and cover it, and the rider would continue to compete when a sensible man would go straight to bed. The wounds healed with amazing speed and rarely become infected.

What do the savage and the racer have in common? Each is doing something that takes all he's got, running perilously close to his survival reserves.

Maybe the doctors who have you tottering up and down the hallway the day after your operation should go a little farther.

JB

Could be. It's sometimes amazing what both individuals and societies can do when they have to—and how much less they do when they don't.

Dear Dr. Schmidt,

Jeffrey Kastin's letter in the June issue suggesting that Tom Easton is anti-feminist struck me as very strange because:

1. There isn't anything irrational or unrealistic about Joanna Russ or Suzy McKee Charnas, though I can see how they might be difficult for a 22-year-old to cope with.

2. I am a woman and a feminist and I always read Analog. I have never been offended on feminist grounds, that I can recall, until now. Analog does reflect our male-oriented culture but so does nearly everything, and we have to cope with that or go mad. Some things, like clitoridectomy, are worth screaming about, but in the face of them, how can a random and possibly innocent remark matter?

3. The authors cited for examples of rational egalitarian writing are both men (one wonderful, the other sexist, as Mr. Easton points out). I find that offensive.

There are dozens of excellent women SF writers around. I'm sure many of them are "egalitarian" enough for these purposes. (Ursula LeGuin, Anne McCaffrey, Marion Zimmer Bradley, to name a few. There are lots more.) To cite only men here seems highly sexist to me and defeats Kasten's argument by putting him in the same boat he's attacking.

As for Tom Easton's rejoinder, describing feminists as rabid dogs is not very "cool." If he had said "cornered dogs," yes. But rabies is a disease, and there is nothing unhealthy about anger on behalf of oneself and others. It seems unhealthy and irrational to me to be objective and logical about the horrendous warping that has been done to women worldwide, regardless of how "necessary" it may have been or seemed at one time. Should we have been calm about Hitler's genocide? Granted, such anger makes men uncomfortable. But should "fair" be defined as "fair so long as I'm not uncomfortable?"

It is my experience that very few men have enough understanding of what women are complaining about to express an opinion about feminism without getting into trouble. Both of these men would have been better off to say nothing. As it is, a thoughtless remark has generated some definitely sexist defenses. Too bad. JANET HODGES

Dear Mr. Schmidt:

I enjoyed your July editorial (Reasons'), in particular your point that, "If the draft is 'wrong,' imposing it on two groups is not less wrong than imposing it on one."

However, there was another sentence that captured my attention in a different way; to wit, "... if you ask a man (or woman), 'Do you want to do this?' and he (she) says, 'No,' it's involuntary."

I find it extremely offensive to be referred to as a parenthetical instance. Women constitute fifty percent of our planetary population and, as such, can hardly be considered an afterthought. Besides, the sentence reads more smoothly without the parentheses.

Although in general I believe that you are very "fair" and "equal," in this particular matter I urge a revision of editorial policy.

SHOSHANA M. ABRASS

I assure you that if I had left those out, somebody else would have been just as offended. I can't win!

Wouldn't it be nice if all the factions could be just a little more tolerant of the various ways people handle this problem—and concentrate more on the much bigger ones that are all around?

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7-9 JANUARY

MIMI 81—14th International Symposium on Mini- and Microcomputers at San Diego, Calif. Info: Secretary, MIMI '81 San Diego, P.O. Box 2481, Anaheim CA 92804.

11-14 JANUARY

AAS General Meeting at Albuquerque, N.M. Info: Peter B. Boyce, AAS, 1816 Jefferson Place NW, Washington DC 20036.

23-25 JANUARY

LASTCON (Capital area SF conference) at Albany Ramada Inn, Albany, N.Y. Guest of Honor—Hal Clement, Fan Guest of Honor—Jan Howard Finder. Registration—\$7 until 25 December 1980, \$12 until 16 January 1981, \$15 at the door. Info: LastCon, c/o Connell, 50 Dove Street, Albany NY 12210. 518-434-8217.

26-29 JANUARY

General Meeting of the American Physical Society at New York City, N.Y. Info: A.P.S., 335 East 45th Street, New York, NY 10017.

9-11 JANUARY

HEXACON 3 at Host Town, Lancaster PA. Registration \$5.00 in advance, \$7.00 at the door. Info: Hexacon 3, c/o Newrock, Box 270A, RD 2, Flemington NJ 08822

2-7 SEPTEMBER

1981 DENVENTION II (39th World Science Fiction Convention) at Denver Hilton, Denver, Colorado. Guests of Honor—C. L. Moore and Clifford Simak, Fan Guest of Honor—Rusty Hevelin, Toastmaster—Edward Bryant. Registration until 1 September 1980, \$25 attending, \$15 supporting. This is the SF universe's annual get-together. Professionals and readers from all over the world will be in attendance. Talks, panels, films, fancy dress competition, the works. Join now and get to nominate and vote for the Hugo awards and the John W. Campbell Award for Best New Writer. Info: Denvention II, P.O. Box 11545, Denver CO 80211. 303-433-9774.

ANTHONY LEWIS

Items for the Calendar should be sent to the Editorial Offices, four months in advance of the issue in which you want the item to appear.

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